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Second Global Conference on Recent Advances in Sustainable Materials 2022

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Research article ○ Abstract only

Principal
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L. Nishanth, Dr. Nayana N. Patil, Nivedita Kumbar, Sravani Kaveti, Dr. Debasish Kar

Pages 369-376

Article preview

Abstract

Abstract

Construction sector across world utilizes cement as one of the most relevant and efficient raw material. It is being estimated that by manufacturing one ton of cement, roughly-one ton of CO_2 gas is emitted into atmosphere. With increasing awareness about global warming, development of alternative binding material that can replace cement completely has gained importance in construction sector. Many studies made on Geopolymer concrete (GPC) has proven its ability to replace cement in construction sector. This experimental investigation concentrates on completely replacing cement by alkali activated GGBFS, Fly ash and alccofine in self-consolidating concrete (SCC) mixes. The current investigation studies effect of E-Coli bacteria on workability and strength characteristics of Self-consolidating geopolymer concrete (SCGC). In this study 10 different SCGC mix samples were prepared by varying cell concentration of E-coli bacteria in

Research article ○ Abstract only

The electrochemical degradation, wear behavior and machining of metal matrix composites based on 6xxx aluminum alloy with ceramic particulate reinforcements; a brief review

Abdullah Yahia Hassan, Abdulaziz Bahkali, Mohammad Yahya Meryahi, Ahmed Gamil Alharbi, … Rajasekaran Saminathan

Pages 377-381

Article preview

Abstract

Abstract

6xxx series aluminum alloy-based metal matrix composite materials are finding greater applicability in various fields like marine, aerospace and automobile industries. In fact, the diverse nature of the availability of ceramic particles and the hybrid combinations of the reinforcements make them versatile in superior properties as well as applications. More over these composites are latest additions to the novel materials developed in recent decades and hence the end products of these composites are reaching the markets in recent times after several years of optimization studies. There is a need to compose the material properties as a review document so that the research on the same domain will get accelerated. Hence it is appropriate

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Research article ○ Abstract only

Lithium ion battery thermal management by using coupled heat pipe and liquid cold plate

Umesh Chavan, Omkar Prajapati, Pravin Hujare

Pages 382-388

Article preview

Abstract

Abstract

Operating temperature of lithium ion battery is critical factor for lifecycle, efficiency and energy storage. In electric vehicle thermal behaviour of batteries affects the overall range of vehicle. Aim of this paper is to provide a thermal management system for cylindrical batteries using heat pipe and cold plate. The heat pipe coupled with battery serves as heat transporter from battery to cold plate. The lumped parametricmodel based on hydro-electrical analogy was developed to verify thermal performance. Bench test setup is developed using actual cylindrical 18,650 type batteries and heating elements. The resultsof lumped parametricmodel compared with actual test data.Result shows temperature drop by 6°C and uniform distribution along the length of battery. Thus proposed design is useful for Lithium ion battery performance and life Novelty in the present research paper is two heat dissipating systems are combined

Research article ○ Abstract only

Radial basis function bipolar fuzzy neural network

R. Preethi, G. Sathiyapriya, S. Anita Shanthi

Pages 389-394

Article preview

Abstract

Abstract

This paper deals with radial basis function neural network on bipolar fuzzy sets. Bipolar Gaussian positive and negative membership function acts as activation function in this network. An algorithm is developed based on Radial basis function bipolar fuzzy neural network. Further, an example is given based on the technique of injection molding process using thermoplastic raw materials, to select the highly durable plastic material product. Four thermoplastic materials such as Polyethylene terephthalate, Polyvinyl

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basis function bipolar fuzzy neural network. Considering the feeding section as the input layer, the

Research article ○ Abstract only

Investigation of surface properties for additively manufactured SS316L parts: Effect of post-processing techniques

Pankaj Sahlot, Mohit Suthar, Vishal Ashok Wankhede

Pages 395-399

Article preview

Abstract

Abstract

This research work aimed to investigate mechanical and surface properties of post-processed stainless steel 316L (SS316L) fabricated through additive manufacturing (AM) process. The AM printed samples were post-processed by nitriding and shot peening process and used for different surface characterizations such as surface roughness, hardness and microstructure. The results showed improved surface roughness of shot peening part and increase in hardness after post-processing. The improvement in the surface roughness has been significant of around 43% to 62% at different energy density. The improvement in hardness is more for nitrided parts as compared to the shot peening.

Research article ○ Abstract only

Design optimization of Spoke IPM motor for improving efficiency using PSO and Rao-1 algorithm based FEA

Supriya Naik, Baidyanath Bag, Kandasamy Chandrasekaran

Pages 400-408

Article preview

Abstract

Abstract

The rate of demand for permanent magnet synchronous motors (PMSMs) in all types of applications is elevated day by day. Many topologies of PMSM have been developed and utilized in different sectors. Many software are available for primary analysis of motors, which have an inbuilt finite element solver. The study

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this research, a 4 pole 24 slots spoke shape IPMSM motor is considered to optimize its parameters such as outer, inner stator diameter, rotor outer diameter, the height of magnet, stator tooth width, and the base width of the slot. Results obtained, and the effectiveness of optimization are validated by comparing with

Research article ○ Abstract only

Effect of diesel engine modification operated with karanja biodiesel and its blends

G.S. Jatadhara, N.R. Banapurmath, T.K. Chandrashekhar, S.B. Nagesh, P.A. Harari

Pages 409-414

Article preview

Abstract

Growing attention in studying renewable and alternate fuels for internal combustion (IC) engines has been increased by concerns about improving engine performance while reducing emissions to satisfy EURO standards and to fulfil increasing energy demands for a growing population. Biodiesels are a possible replacement to diesel fuel since, they are renewable and have qualities similar to fossil diesel. For diesel engines, biodiesel generated from Karanja oil is a better diesel substitute. The use of alternative fuels in a CI (Compression ignition) engine reduces performance while also increasing hydrocarbon (HC) and carbon monoxide (CO) pollutants. However, making the engine entirely adiabatic by combining biodiesel with diesel and applying thermal barrier coatings (TBC) to the piston, cylinder wall, and inlet and outlet valves will improve overall engine performance. In light of this, TBC diesel engine components coated with partly

Research article ○ Abstract only

Hydrogen adsorption behaviour in Graphene Oxide doped Ni/Pd@f-MWCNTs – A sustainable cleaner energy approach

Madhavi Konni, Manoj Kumar Karnena, Saratchandra Babu Mukkamala

Pages 415-419

Article preview

Abstract

Abstract

fuels are needed to reduce emissions from vehicles. Hydrogen is considered an alternative fuel for running vehicles, wherein the recent years, many researchers have been focusing on the current study, [illegible] nanoparticle decorated multiwalled carbon nanotubes were synthesized using three different solvents, i.e., triethylamine, dimethyl fluoride and water. The characteristics of these materials are examined through scanning electron microscopy and surface area analysis and further analyzed for hydrogen sorption with the help of BELSORP HP for adsorption isotherms. The experiment found that the solvents used to prepare

Research article ○ Abstract only

Designing of novel nanoemulsions of retinol using box Behnken design for *psoriasis*

Mukul Sharma, Mukesh Chandra Sharma, Rakhi Khabiya, Akanksha Dwivedi, … Sanjay Jain

Pages 420-426

Article preview

Abstract

Psoriasis is a chronic inflammatory disease, which is triggered by genetic and environmental factors, has been found to be associated with comorbidities like psoriatic arthritis, Crohn's disease etc. Retinol acetate is an effective, first line anti-psoriatic drug for Psoriasis but researchers have indicated toxicity in case of its overdose. Present study is an attempt to design Retinol Acetate Nanoemulsion RANE with optimum dosage, improved hydration and penetration, hence better absorption. Box Behnken model of Design Expert version 12 was used for the optimization process to prepare O/W Nanoemulsion. RANE was evaluated by pH, viscosity, conductivity, particle size analysis and responses like % drug content and % *in-vitro* drug release at different time intervals were experimentally recorded. Predicted value and experimental value of % drug content was found to be 83.84±0.12 and 80.24±1.14 respectively with relative error of 3.6±1.02. While these

Research article ○ Abstract only

Studies on optical and electronic characteristics of ternary zinc-tellurite glasses with varying Zn doping concentration

Sukhdev Bairagi, K.S. Bartwal, S.K. Dhiman, S.K. Mahajan, Ghizal F. Ansari

Pages 427-433

Article preview

Abstract

20%, were synthesized by customary melting and quenching method. The morphological, physical, and optical characteristics of the material were investigated. Differential scanning calorimetry was done for glass transition temperature, whereas X-ray diffraction and, Scanning Electron Microscopy (SEM) -Energy Dispersive X-ray Analysis (EDAX or EDS), was done for information of surface morphology and batch composition. Structural information is gathered by Raman spectra. Physical parameters as density, oxygen packing density (OPD), Zn^{2+} concentration, poleron radius and inter atomic distance have been calculated. Optical properties such as coefficient of absorption, optical energy band gap, refractive index and Urbach's energy were calculated. The effect of ZnO concentration on physical and optical parameter has been

Research article ○ Abstract only

Effect of Gd^{3+} doping on structural, vibrational, dielectric, and ferroelectric properties of $Bi_{0.5}Na_{0.5}TiO_3$ ceramic

Bijayalaxmi Kuanar, Biswajit Dalai, Dhrubananda Behera, Hari Sankar Mohanty

Pages 434-438

Article preview

Abstract

Abstract

The effect of adding Gadolinium on bismuth sodium titanate ceramics on structure and electrical characteristics with the chemical formula $(Bi_{1-x}Gd_x)_{0.5}Na_{0.5}TiO_3$ (x=0.00, 0.02, 0.04, 0.06,0.08 and 0.10) (BGNT) were examined using a solid-state reaction approach. The pure perovskite rhombohedral phase is visible without any secondary phase for all of the compositions in the X-ray diffraction pattern. A comprehensive investigation of Raman spectra revealed the vibrational and phonon modes of the molecular structure. The dielectric investigation of sintered samples in temperature and frequency dependence revealed two dielectric peaks attributable to factors generated by phase transitions from ferroelectric to antiferroelectric and antiferroelectric to paraelectric. With a low remanent polarization (Pr=0.65 μC/cm^2) and a coercive field (Ec=8.62 kV/cm), the polarisation hysteresis (P–E) loop demonstrated

Research article ○ Abstract only

Effects of barrier chemicals on flame retardant properties of inherently flame retardant fabric

RG Revaiah, TM Kotresh, Balasubramanian Kandasubramanian

Pages 439-442

Abstract

Barrier chemicals are used for coating a substrate fabric surface when air-proofness or water-proofness is desired in military operations. The properties of the base fabric changes depending upon the barrier chemical employed for coating. In this study, authors selected inherently flame retardant Kevlar as base fabric and coating was done using four chemicals viz: Natural rubber (NR), Polyurethane (PU), Neoprene, and Hypalon. While NR and PU readily burn, Neoprene and Hypalon resist ignition due to the presence of chlorine atom. The resultant flame retardant properties were studied using UL-94 V and NFPA-701 methods. Although Kevlar is flame retardant in nature, it was observed that some coatings burned readily leaving behind charred base fabric.

Research article ○ Abstract only

Fresh and hardened state properties of waste tire fiber and steel fiber reinforced concrete

S. Amaan Mohammad, T. Naga Chaitanya Krishna, T. Saketh, C. Yashwanth Ganesh, Dhanya Sathyan

Pages 443-448

Article preview

Abstract

Abstract

Concrete is a widely used construction material but is known that several properties of plain cement concrete can be improved by the addition of certain fibers in certain percentages and this procedure-oriented substance is known as Fiber-reinforced concrete (FRC). And one of such most commonly used fibers is steel fiber, which is known to improve the mechanical properties of concrete. The usage of the waste tire as fibers would reduce the environmental degradation and it is also proven that it too can improve the properties of PCC. This paper investigates certain fresh and hardened state properties namely workability, compressive strength, and abrasion resistance of concrete reinforced with both steel and tire fibers in various proportions of the volume of concrete at 0%, 0.25%, 0.75%, 1%, and the results were analyzed

Research article ○ Abstract only

Narendra Kumar Rana, Nabam Tevi, Pranjol Borah
Pages 449-455

Article preview

Abstract

Abstract

Large panels made of composite materials are utilised often in the aerospace sector. In most cases, this type of panel will fracture when subjected to a wide variety of stresses and boundary conditions. The panel receives additional rigidity through the addition of a flange, which is also supported by a web. In this study, a three-dimensional finite element stress analysis is performed on a firm panel that consists of a web, a flange, and a panel with an interface between the flange and the panel. The analysis is performed in preparation for an arrangement of composite panels of this sort. The influence that anisotropy, layer stacking sequence, and ply orientation have on the stress components is taken into consideration. For the purpose of this investigation, a graphite-fiber reinforced polymeric (GFRP) composite is used. Laminate arrangements of $[45^0/-45^0/45^0/-45^0]_2$ and $[45^0/-45^0{}_2/45^0]_2$ angle-plied prepregs have been taken. This

Research article ○ Abstract only

Prediction of single cylinder direct injection diesel engine performance fuelled with lemon peel oil biodiesel using artificial neural network

S. Sivamani, M. Udayakumar, N. Sellappan
Pages 456-463

Article preview

Abstract

Abstract

The aim of the present work is to predict the performance of single cylinder direct injection diesel engine fuelled with lemon peel oil biodiesel (B25) loaded by ceria nanoparticle additives and coated with yttria-ceria stabilized zirconia using Levenberg-Marquardt algorithm of single-input multiple-output artificial neural network (ANN). The dependent variables are brake power, indicated power, frictional power, brake thermal efficiency, indicated thermal efficiency, volumetric efficiency, fuel flowrate, air flowrate and specific fuel consumption at varying loads from 0 to 100%. The prediction ability of ANN was evaluated by determination coefficient (R^2) and root mean square error (RMSE). The average R^2 and RMSE of 0.93 and

Research article ○ Abstract only

Experimental studies for comparing Conventional concrete with Bubble deck concrete

Samantha Konuri, T.V.S. Vara lakshmi

Pages 464-476

Article preview

Abstract

Abstract

The main objective of this study is testing of cubes with same water/binder ratio of 0.45 of different grades like M20, M25 and M30 of Conventional concrete cubes (CCC) & Bubble Deck concrete cubes (BDCC) and Conventional 35% Fly Ash concrete cubes (CFACC) & Bubble deck 35% Fly Ash concrete cubes (BDFACC) for compressive strength at 7, 28, 90, 180 and 360days through usage of 30mm, 60mm and 90mm Polypropylene hollow balls in Bubble deck concrete cubes(BDCC) and Bubble deck Fly concrete cubes(BDFACC) and also for % of Weight reduction. It has been observed that as the percentage of weight reduction increases, the compressive strength of the concrete decreases by 0 to 0.3%. And furthermore the compressive strength of Conventional concrete cubes(CCC), Conventional Fly concrete cubes(CFACC) and Bubble Deck concrete cubes(BDCC), Bubble Deck Fly concrete cubes (BDFACC) has been nearly same

Research article ○ Abstract only

Effect of ionic salt on PVA/Ferric nitrate nano fibers

Tirumala Rao Kotni, Aiyush Verma, Abhisek Panda

Pages 477-480

Article preview

Abstract

Abstract

Polyvinyl alcohol/Ferric nitrate composite nano-fibers with and without addition of ionic salt of potassium chloride (KCl) are produced by using electrospinning. 8% PVA/Ferric nitrate solution and 0.2wt% ionic salt (KCl) are used at an applied voltage of 25kV to develop fibers with no beads. Different polymer solutions with and without the addition of ionic salt are prepared and used for developing nano fibers. The analysis describes the effect of ionic salt on the sythsized fiber quality. Experiments are carried out at different

fibers, while the addition of ionic salt of KCl to the PVA/Ferric nitrate solution resulted in straight nano-

Research article ○ Abstract only

Topical delivery of natural extract for accelerated wound healing

Nausheen Ahmed, R. Deveswaran, P. Parasuraman, S. Bharath, ... P.S. Santosh

Pages 481-491

Article preview

Abstract

Abstract

The present research work aimed at developing a topical dosage form from onion extract for accelerated wound healing action. Onion extract was subjected to phytochemical screening, Gas Chromatograpgy-Mass Spectral analysis, *in silico* studies against selected proteins involved in wound healing process. It was assessed further for *in vitro* cytotoxicity and *in vitro* scratch assay on mouse fibroblasts cell line. Topical film forming onion extract spray formulations were prepared using Eudragit RS-100 as the film forming polymer using mixture of both stinging and non-stinging solvents. Gels were prepared using carbopol as gelling agent. Topical gels and film forming sprays were prepared and compared for wound healing. Gel formulations prepared with carbopol-940 and hydroxy propyl methyl cellulose showed better physico-chemical properties. The developed formulations were characterized for pH, viscosity, swelling index

Research article ○ Abstract only

Numerical performance analysis of a twin blade drone rotor propeller

Pandiyarajan Rajendran, Agnishwar Jayaprakash

Pages 492-498

Article preview

Abstract

Abstract

Twin-blade propellers are typically used in applications that require precision flight control and agility due to their high relative efficiency. The thrust produced by twin-blade propellers is low and hence is only used in lightweight drones focused on quick reflexes and speed rather than lifting capacity and stability. The present study focuses on developing a twin-blade propeller model with improved torque and coefficient of

The validity and accuracy of the developed numerical simulation model are influenced by the mesh and turbulence parameters of the developed model. In the present work, the wall distance factors were modeled by the shear stress transport model, and the meshing parameters were subjected to a grid convergence

Research article ○ Abstract only

Hybridization of μ-electrochemical discharge machining (μ-ECDM) process: A review

Sahil Grover, Sarbjit Singh, S.K. Mangal
Pages 499-508

Article preview

Abstract

Abstract

The Electrochemical Discharge Machining process is a non-conventional and a novel micro machining technique, which combines the advantage of ECM (chemical etching) and EDM (melting and vaporization) to machine hard, brittle and electrically non-conductive materials like glass, ceramics and composites with improved surface finish and machining rate. It is extensively used for making surface channels, microgrooves and micro-holes in glass. The necessity for hybridization of the ECDM process was triggered in order to improve the efficiency and machining performance of the process. The purpose of this article is to provide information in form of a review to readers on the existing triplex hybrid techniques of the ECDM process that is based on primary and secondary methods and its advantages have been discussed.

Research article ○ Abstract only

On demand reconfigurable notch-based UWB MIMO antenna for wireless application

Ranjana kumari, Arun Singh Rawat, Pranav Suri, Prabhakar Kaudinya, Kartikey Dwivedi
Pages 509-516

Article preview

Abstract

Abstract

In this paper, on demand reconfigurable notch based UWB-MIMO antenna for wireless applications has been proposed. The proposed antenna consists of two square patch monopole radiators with inverted Z and

(S21<-15dB) over the entire operating band. Reconfigurability has been achieved using switching elements S1 and S2 which are inserted in the extended U slot and inverted Z slot in each radiator. When both the switches are OFF, notch mechanism is obtained on both the notches C band uplink (5.7 to 6.5GHz) and C band downlink (3.6 to 4.2GHz) simultaneously. When the Switch 1 is ON the notch is obtained at C band

Research article ○ Abstract only

A comparative analysis of exergy using dual blends of biodiesel in a DI engine

Ramakrishna N. Hegde, Gangadhara Rao, Jagadeesh Bantwal, Praveen Shenoy

Pages 517-524

Article preview

Abstract

Abstract

The scarcity of petroleum fuels and pollution concerns has led to the search for alternate fuels. In this investigation, cottonseed and Simarouba oils are transesterified to produce the corresponding biodiesels. The esterification and transesterification were carried out in the presence of heterogeneous catalyst MgPO4. The various properties of biodiesel are determined in the laboratory. Vateria indica is a species endemic to India that belongs to the Dipterocarpaceae family. The oil of Vateria indica is obtained by an aqueous extraction method. This oil is transesterified to obtain the biodiesel by a two-step process of esterification followed by transesterification. This biodiesel is blended with diesel in 10% and 20% volumetric proportions. The cottonseed and Simarouba biodiesels are blended in equal proportions with diesel and tested for performance and exergy analysis along with Vateria indica blends. It is found from

Research article ○ Abstract only

Sound radiation of a GLARE panel at elevated temperature

Arul Raj Vaiduriyam, Lenin Babu Mailan Chinnapandi

Pages 525-531

Article preview

Abstract

Abstract

onset locations under elevated temperature using the finite element method. The effect of load location and temperature on sound radiation patterns is computed using Rayleigh integral method. It is observed that the panel's natural frequencies reduced with an increase in temperature and changes in sound radiation pattern due to modes nodal and anti-nodal shift.

Research article ○ Abstract only

Comparative life cycle assessment of recycled soil-stabilized bricks and traditional bricks

Inamdar Ahmed Raza, Navdeep, Rihan Maaze, Gyanendra Kumar Attri, Sandeep Shrivastava

Pages 532-537

Article preview

Abstract

Abstract

The different stakeholders are concerned about management and utilization of construction and demolition waste (CDW) resulted while construction, renovation, & devasting of structures. Excavated soil is a part of CDW and there is significant proportion of excavated soil, which is lying un-utilized or used for construction of sub-base in pavement. The excavated soil and brick waste are utilized in production of soil-stabilized bricks (SSB). In this study the SSB are developed by using 5% cement, 50% brick waste, and 50% excavated soil. This study evaluated the environment impacts of a SSB and conventional brick by using life cycle assessment (LCA) approach as per ISO 14040. LCA was performed with SimaPro 9.3.0 software. Environmental Impact classification i.e., climate change, ozone depletion, acidification & eutrophication, human-toxicity & particulate matter formation was estimated and interpreted. The incorporation of CDW in

Research article ○ Abstract only

Analysis of morphological and electro-optical properties of silica nanoparticles induced vertically aligned liquid crystal - effect of doping and coating techniques

Ankit Rai Dogra, Vandna Sharma, Pankaj Kumar

Pages 538-543

Article preview

Abstract

Abstract

a couple of steps such as spin coating, high-temperature baking and mechanical rubbing which limits their applicability to flexible LC display device applications. In the present work, VA of nematic LCs in a confined cell is induced using two different approaches: one via doping of silica nanoparticles (SNPs) as guest particles in LCs and the other with the deposition of SNPs layer on ITO glass substrates. Further, morphological and electro-optical (E-O) studies have been studied for the SNPs doped and SNPs coated vertically aligned liquid crystals (VALCs). The morphological study shows the identical degree of dark (black) and bright (white) textures of SNPs doped and coated VALC cells at OFF and ON states, respectively

Research article ○ Abstract only

Effect of substrate on interfacial electronic properties of ferrocene thin films

Abhishek Kumar, Ashish Kumar, Anwesha

Pages 544-548

Article preview

Abstract

Ferrocene molecular thin films on conducting substrates have potential for novel molecular electronic devices. Based on X-ray absorption spectroscopy and photoemission spectroscopic techniques, we have analyzed electronic properties of ferrocene thin films nano-junctions on layered highly oriented pyrolytic graphite (HOPG) and epitaxially grown graphene on Ni(111) substrates. Fe L edge analysis indicates that layered structure of HOPG has significant impact on room temperature desorption of ferrocene as compared to grapheme on Ni(111) substrate. C-K edge XAS spectrum reveal that ferrocene molecules do not have preferred orientation for adsorption on grapheme grown on Ni(111) substrate. In addition, X-ray absorption spectroscopy (XAS) reveals that there is no change in iron atom oxidation state suggesting that ferroence interaction is feeble with grapheme on Ni(111) substrate and HOPG

Research article ○ Abstract only

Simulation of TAZ:Ir(ppy)3-BCP/ZnO heterostructure OLED

Ritu, A.M. Quraishi, Sandhya Kattayat, Smitha Josey, P.A. Alvi

Pages 549-551

Article preview

Abstract

heterostructure based OLED. In addition, we have also optimized the thickness of the ETL (electron transport layer) of the designed OLED. For the optimized ETL (ZnO layer) we have simulated the I-V characteristics, Voltage vs light flux curves and current density vs light flux curves.

From such simulation study, it has been found that the designed OLED can work properly at the room temperature with the operating voltage~4.25V. Further, the optimized ETL thickness in the TAZ:Ir(ppy)3-BCP/ZnO heterostructure based OLED should be 50 or 60nm for proper operation and for getting the noticeable light flux.

Research article ○ Abstract only

Fabrication and characterization of epoxy solar glass

Saigeeta Priyadarshini, Aman Prakash, Sanya Gupta, Akanksha Mishra, Himanshu Payal

Pages 552-557

Article preview

Abstract

Abstract

In the current era, when the whole world has increased the consumption of renewable energy, solar power is making its place viable in urban and industrial areas. This solar power is being generated by converting sunlight into electricity through Photovoltaics (PV) which is also called as solar cells. Solar cells comprise of many parts from which tempered glass is the one whose high strength acts as a shield for the solar modules by protecting them from mechanical loads and extreme weather conditions. Looking at these conditions, this paper has attempted to suggest an alternative of traditional tempered glass being used since the decades. In this paper, a composite plate of 4mm thickness has been prepared by using the clear epoxy named L4AU and its mechanical as well as optical properties have been investigated. The result shows that its typical tensile strength values range from 2.4 to 2.6kg/mm2, the flexural strength lies in the range of

Research article ○ Abstract only

Electrochemical quantification of Vanillin using hydrazine derivative modified pencil graphite electrode

Sreelekshmi, Abhishek Wilson, Bhama Sajeevan, Gopika M G, … Beena Saraswathyamma

Pages 558-563

Abstract

Abstract

Herein this report, a disposable electrochemical sensor was developed by modifying pencil graphite electrode by Poly 2,4-dinitrophenylhydrazine (PDNPH) using electropolymerizing technique for the detection of Vanillin (Van) or 4-Hydroxy-3-methoxybenzaldehyde. Electrochemical estimation of Vanillin was done with the help of Cyclic Voltammetry and Differential pulse voltametric techniques. The morphological characteristics were studied using SEM analysis. A single oxidation peak was obtained for Vanillin at the potential of+0.5214V. The adapted electrode exhibits a linear range of 1µM –900µM with LOD of 0.34µM. The PDNPH/PG electrode was then used for real sample quantification and it manifested RSD value less than 5% which revealed that the developed sensor is a favorable tool for quantification of Van. This is the first-time reporting Vanillin determination by using a modified pencil graphite electrode as

Research article ○ Abstract only

Design and optimisation of heat sinks to enhance the thermal conductivity through simulations

K.D. Bopanna, M.K. Srinath, M. Ravikumar, Sujeeth Swami, J. Nagendra

Pages 564-569

Article preview

Abstract

Abstract

A Pin-Fin is a component of heat sink, in a thermal system that aids in the dissipation of heat produced. The efficiency of the system is determined in large part by the design of the pin fin. The goal of the study was to use the Taguchi method of optimization to construct a Pin-fin with certain geometry and analyse it using computational simulations. To study the numerous tests to be undertaken on the performance characteristics, an orthogonal array was used. Base Plate Thickness, Fin Height, Fin Width, and Fin Spacing were all considered when designing the heat sink's pin–fin. As a result, the L-9 orthogonal array was chosen, and testing was carried out using commercial simulation software. The simulation testing took place in a Steady-State environment. For efficiency, heat flux, and temperature difference V/s heat sink characteristics, the Signal to Noise ratio was shown. Various iterative trials were compared using the

Research article ○ Abstract only

Bhama Sajeevan, Gopika MG, Sreelekshmi, Abhishek Wilson, … Beena Saraswathyamma

Pages 570-576

Article preview

Abstract Graphical abstract

Graphical abstract



Research article ○ Abstract only

The influence of metakaolin, silica fume, glass fiber, and polypropylene fiber on the strength characteristics of high performance concrete

Sachin Patil, H Sudarsana Rao, Vaishali. G. Ghorpade

Pages 577-586

Article preview

Abstract

Abstract

Products that are pozzolanic Metakaolin (MK) & Silica fume (SF), both smaller than cement, are being used in the making of concrete and have been shown to improve the characteristics of the concrete. This study uses the combination of MK and SF as a additional cementitious substance. It was planned to explore the mechanical characteristics of Binary Fiber and Admixture based High-Performance Concrete (BFAHPC), which uses glass fibres (GF) and polypropylene fibres (PPF) as an inclusion. The ratios of water to binder (W/B) from 0.275 to 0.350, were used, with an aggregate to binder content (A/B) of 1.75. MK and SF were substituted in proportions ranging from 0% to 15%. GF was introduced in volume proportions ranging from 0% to 1%, and PPF was used at 0.25 percent only. The overall influence of MK with SF at 5% each as cement replacements, with fibre dosages of GF=1% and PPF=0.25% for W/B of 0.275, was indicated to be the perfect

Murali Pujari, Getachun Demeke, Abebe Worku, Srikanth Komarabathina
Pages 587-590

Article preview

Abstract

Abstract

This work assess the potentiality of tannery buffing chromium-containing solid waste as supplement material for concrete work in the construction industry. The parameters determined to characterize the tannery buffing solid wastes are pH (7.2), moisture content (0.53%), carbon content (0.2%), volatile content (0.18%), and total chromium (28 mg/kg). The parameters used to compare the performance of the constructed concrete block with the standard concrete blocks are density, compressive strength, and water absorption. The experimental results confirmed that the density, compressive strength, and water absorption of the constructed concrete blocks are in the range of 1003.33 – 1226.7 kg/m^3, 5.33 – 8.62 N/mm^2, and 3–4%, respectively which are comparable with the density (1383.3 kg/m^3), compressive strength (7.67 N/mm^2), and water absorption (4%) of the standard concrete block. These results indicating

Research article ○ Abstract only

Uniaxial tensile properties for bamboo and jute fabric reinforced natural rubber

Shri Harsh K, Surbhi Razdan, Deepti Sanjeev Marathe
Pages 591-596

Article preview

Abstract

Abstract

Synthetic fibers were used as reinforcements for a long period of time due to their excellent properties and compatibility with natural rubbers. Tensile properties and manufacturability of natural fabrics- Jute and Bamboo are studied. Layer by layer type of composite was manufactured by compression moulding and the crosslinking of matrix and reinforcement was done by using chemlok 250 as adhesive. Properties obtained from the tests are given in this paper. Production was carried out in two stages, 1st stage was by using adhesive and the results were compared and based on these results 2nd stage of manufacturing was carried out without using adhesive and specimens of ASTM D412 standard die type A was obtained by water jet

Research article ○ Abstract only

Structural performance of hybrid fibres incorporated Re-Cycled aggregate RC slab

M. Vinod Kumar, C. Jaideep, Y.M. Siddaramaiah, M. Muthukannan

Pages 597-603

Article preview

Abstract

Concrete is a material that mainly consists of coarse aggregate and mortar. The forming of cracks is an existing problem in Reinforced Concrete (RC) slab. In this research, hybrid fibres namely steel and polypropylene fibres in suitable combinations are identified and incorporated to concrete to regulate the formation and development of cracks in RC slabs. In Hybrid Fibre Reinforced Concrete (HFRC), 1 per cent of steel fibre and 0.30 per cent of polypropylene fibre is added, which is the effective amount of reinforced concrete added based on information obtained from the various research studies. In addition, now-a-day use of re-Cycled Aggregate (RCA) is strongly recommended to address the lack of traditional coarse aggregate. By using RCA as a partial substitution of coarse aggregate with an inclusion of 1% of steel fibre and 0.30% of polypropylene fibre to the concrete volume in the study, a typical approach is recommended

Research article ○ Abstract only

Structural, magnetic, dielectric and magneto-dielectric response in $Pb_{0.75}La_{0.25}TiO_3$-$CoFe_2O_4$ composites

Tiku Ram, Akshay Kumar, Kanchan Khanna, Sunil K. Dwivedi, Sunil Kumar

Pages 604-607

Article preview

Abstract

$_{(x)}Pb_{0.75}La_{0.25}TiO_{3-(1-x)}CoFe_2O_4$ (where×=0.40, 0.42, 0.44, 0.46, 0.48, 0.50) ceramic composites have been successfully synthesized via mechanical mixing method. The effect of stoichiometric proportions on structural, dielectric, magnetic and magnetodielectric properties have been thoroughly studied. The presences of both tetragonal (ferroelectric) and spinel cubic (ferrite) phases have been shown in XRD patterns, providing direct evidence for successful multiferroic composites synthesis. Magnetic hysteresis at

(~8.647emu/g to 6.761emu/g) and~46emu/g to 39emu/g for×=0.40 to×=0.5. The dielectric constant has

Research article ○ Abstract only

^{1}H NMR based study of cord blood platelet rich plasma conjugated with N isopropyl acrylamide-gold nano particles

Suraksha Shetty, Ashmitha Kishan Shetty, Serene Joy, Manasa Biligowda Latha

Pages 608-612

Article preview

Abstract

Gold nanoparticles (AuNPs) have avast scope and can be widely used inimaging, therapeutic, and diagnostic systems. The complex synthetic chemistry of gold nanoparticles enables for precise control of both physicochemical and optical features. In addition to being nontoxic, gold cores are alsoinert and biocompatible. To understand the adsorption of proteins in the umbilical cord blood Platelet Rich Plasma (UCB-PRP) with Poly-(N isopropylacrylamide) (PNIPAM) and AuNPs, Nuclear Magnetic Resonance (NMR) spectroscopy was used to characterize the complex system. As a result, NMR analyses revealed the structural stability of AuNPs coupled with UCB-PRP and polymer. The findings specified that protein–PNIPAM-AuNPs conjugate can influence protein activity and to a large extend resist degradation of protein, increasing the target delivery of desirable protein at cellular level

Research article ○ Abstract only

Evolutionary algorithms based optimization of electrochemical discharge micromachining process during micro-channel fabrication on glass

Krishnendu Mondal, SK Hikmat, Bijan Mallick, Jayanta Mahato, Pijush Dutta

Pages 613-619

Article preview

Abstract

Abstract

models for Tool wear rate (TWR) and heat affected zone (HAZ) are established during machining performances by micro-electro chemical discharge process. Influence of process parameters like voltage, duty ratio, pulse-frequency and electrolyte concentration on surface viewer of TWR and HAZ also illustrated during fabrication of micro-fluidic channel on silica glass. In this paper best fitted model during

Research article ○ Abstract only

Quality characteristic optimization in CNC turning of aluminum bronze by using Taguchi's approach and ANOVA

K Maneesh, Muhammad Shan, Sejin Xavier, M B Vinayak, M Shafeek

Pages 620-628

Article preview

Abstract

Abstract

The purpose of this study is to look at the impacts of process parameters on surface finish and material removal rate (MRR) in order to find the best settings for these parameters. In addition, the Analysis of Variance is utilized to investigate the impact of cutting parameters on machining. Turning experiments were carried out using predetermined cutting parameters using a tungsten carbide cutting tool, according to an experiment plan based on the L9 orthogonal array. For the responses of surface roughness and material removal rate, the turning parameters were spindle speed, feed rate, and depth of cut. The predetermined parameters are selected based on the machine specitfications and observations. The influence of three cutting speeds (800, 1000, and 1200m/min), three feed rates (0.10,0.15, and 0.20mm/rev), and three depths of cut (0.20, 0.40, and 0.60mm) factors on surface roughness in the CNC turning lathe was

Research article ○ Abstract only

Low temperature synthesis of MoO_3 nanoparticles by hydrothermal method: Investigation on their structural and optical properties

A.V. Avani, R.B. Chrisma, E.I. Anila

Pages 629-633

Article preview

Abstract

biomedical applications by virtue of their excellent structural, optical, electrical, and catalytic characteristics. The work presented here demonstrates the synthesis of orthorhombic MoO_3 through the facile hydrothermal method at low temperature. Structural and optical characterization of the prepared sample was examined. XRD studies and Raman spectroscopy were carried out to study the structural behavior of the sample. The XRD peaks were concordant with the standard peaks of MoO_3, which corresponds to the orthorhombic structure of MoO_3. Micro-strain effects were also verified by the W-H method using UDM, UDEDM, and USDM. Raman spectroscopic data ascertained the orthorhombic phase of MoO_3. From Tauc plot, a wide bandgap value (4.9eV) was evaluated. In photoluminescence spectroscopy

Research article ○ Abstract only

A simple fabrication of Mn doped SnO_2 nano particles towards improved congored degradation photocatalytic activity

P. Rajeswaran, M. Shanmuganathan, T. Shanmuga sundari, A. Elavarasan, P. Sivakarthik

Pages 634-640

Article preview

Abstract

Abstract

Transition metal doped semiconductor metal oxide nanostructured materials has drawn serious attention due to their remarkable photo catalytic activity. In this work, we used a simple chemical method to synthesize pristine as well as Mn-doped SnO_2 nanoparticles. Powder X-ray diffraction results reveal that both pristine and Mn-doped SnO_2 nanoparticles are translucent with a tetragonal phase with highly crystallinity. TEM analysis reveals the spherical morphology with agglomeration (TEM).UV–Vis DRS signify that reduction of band gap energy with the increase of Mn concentration levels(0,2,6%wt). The structural properties of a material are ascertained using the Fourier transform infrared spectroscopy technique. The photo catalytic performance of as synthesized materials was investigated towards the degradation of Congo red in an aqueous solution under visible light irradiation. The photo catalytic efficiency of Mn (6wt%) doped

Research article ○ Abstract only

Anti-corrosion behaviour of TiO_2-nanocomposites coated stainless steel

Nageswara Rao Lakkimsetty, Mai Ahmed Ali Al Qaidi, Varghese M Joy, Karunya S, Feroz Shaik

Pages 641-647

Abstract

The present study reports the corrosion behavior of Nano coatings on steel substrate (304L SS) by measuring the corrosion rate via the weight loss method. The morphology and chemical constituents of the nanocomposite thin film were characterized by Scanning Electron Microscopy (SEM), and Fourier Transforms Infrared Spectroscopy (FTIR) from various researchers. TiO_2: ZnO: Polyamide (PA) mixture ratio (0.276:0.200:0.524) indicates the minimum weight loss in the corrosive environment (0.921), so it was selected as the optimum mixture for coatings. As a result, the plating of the nanocomposite based on thin-film technology creates high-performance functional Nano coatings for corrosion resistance. Thus, minimize the costs of repairs due to corrosive damage, avoid service interruption and operation failure of the process equipment, and save lives from injuries caused by weathered equipment and facilities

Research article ○ Abstract only

Effect of fuel flow analysis on a ECU controlled RCCI engine with ETBE blends

D.V.V.S. B. Reddy Saragada, Vinjamuri S.N.Ch Dattu, Puli Danaiah

Pages 648-652

Article preview

Abstract

Abstract

ETBE is an oxygenate that is used as an octane additive in gasoline. ETBE is created by combining isobutylene and ethanol in the presence of a catalyst. The use of alternative fuels has always had the capability to reduce carbon dioxide and other greenhouse gas emissions from automobiles and trucks, which account for the biggest chunk of greenhouse gas emissions. Alternative fuels are the best available option for outdated fossil resources because they reduce pollution, reduce oil imports, and can be produced sustainably. In this research, several experiments were conducted on RCCI engine and is operated with wire throttle positions. Later, various Loads and different blends of diesel with ETBE are tested to demonstrate the maximum return that can be habitual in terms of air need, fuel requirement, AFR, and volumetric outputs, and the results and justifications for this study are described. Moreover, it was shown that at lower

Research article ○ Abstract only

A.R. Udhaya, B. Rajeswari, T. Mugilan
Pages 653-658

Article preview

Abstract

Abstract

This present work aims to perform the finite element analysis of a helical compression spring used in electric three-wheelers, considering various spring materials. A helical compression spring stores energy in the shock absorber of an automotive suspension unit. The spring material must be elastic and have enough energy to tolerate external mass changes. The elastic characteristics of a spring material and its stability are investigated using static structural analysis in ANSYS. The selected spring materials for this current investigation are Spring Steel (SPS), Stainless Steel (SS), Mild Steel (MS), and Chromium Vanadium steel (CVS). The total deformation and equivalent von-mises stress of selected spring materials are predicted. A comparison has been made between the chosen steels, and the maximum deformation was found as 11.59mm in both spring steel and chromium-vanadium steel. Hence, the best suitable spring material was

Research article ○ Abstract only

Experimental study on strength behaviour of concrete reinforced with natural fibers

K N Pruthviraj, Srishaila Jagalur Mahalingasharma, Sachin Patil
Pages 659-667

Article preview

Abstract

Abstract

In this study, concrete with an addition of natural fibers combination such as sisal, jute and pineapple fibers are added to investigate the characteristics of concrete as trend of fiber usage is increasing. The ratio of water to binder was set to 0.4. Combination of fibers like sisal and pineapple, pineapple and jute, and jute and sisal were added in percentages 0.25%, 0.5% and 0.75% of volume and with lengths of 22mm and 30mm.The objective of this study was to explore if natural fibers like sisal, jute, and pineapple in combination can be used to increase structural concrete's mechanical properties of fiber reinforced

Evaluation of crystal size present in graphene oxide quantum dots using optical and Raman spectroscopy

Prabin Kumar Mahato, Swarat Choudhuri, Chandra Kumar, Sumit Roy, Prashanta Patra

Pages 668-673

Article preview

Abstract

Abstract

Graphene has received enormous research interest in recent years. Here we report, the evaluation of the crystal size of graphene oxide(GO) quantum dots(QD) using optical and Raman spectroscopy. Raman studies indicate the D, G, and D¨ band, indicating the formation of GO-QD. Crystal size was estimated using the Raman spectra, which is 4.2 nm, comparable to Bohr size, indicating the synthesis GO is a QD. XRD, FTIR, FESEM, and EDAX were used to explore GO-QD and structural and physicochemical features. The XRD pattern revealed reflection planes (001) at $2\theta=9.50°$. Crystal size was estimated using the Scherer equation, which is 2.2 nm. Moreover, the Optical spectra-based Brus model and Hyperbolic Band (HB) models have been used for the estimation of size. An FTIR was used to confirm the existence of oxygen-containing functional groups in GO. FESEM revealed that GO quantum dots have a sheet-like morphology. The zeta

Research article ○ Abstract only

Impact of recycled aggregates on mechanical properties of concrete

Pulkit Mathur, Tejas Joshi, Urmil Dave

Pages 674-680

Article preview

Abstract

Abstract

The voluminous disposal of demolition waste into landfills is proving to be an owing cause of environmental pollution. An essential outlook for economic construction is the processing of the waste procured from construction works to preserve an ecological balance. To contribute towards research to generate sustainable reusable construction products, an attempt was made to analyse the feasibility of recycled coarse aggregates (RCA) as a substitute for coarse aggregate. An experiment has been conducted to

processed at a nearby recycling plant. This C & D waste was from recent collapse of one of the girder of

Research article ○ Abstract only

Environmentally benign synthesis of 2,3,7-Substituted 1,8-Naphthyridines devoid of catalyst

Bhaskar Pittala, Srinivas Reddy Dachepally, Shashikala Kethireddy, Janardhan Eppakayala, Laxminarayana Eppakayala
Pages 681-684

Article preview

Abstract

Abstract

A series of 1,8-Naphthyridines were synthesized from the starting material, 2-Aminonicotinaldehyde (also called as 2-amino- Pyridine-3- carbox aldehyde) through Friedlander annulation. The reaction proceeds in presence of eco-friendly reusable Poly Ethyelene Glycol-400(PEG:400) solvent in catalyst free conditions, shorter reaction times and in good yields. All the synthesized compounds were characterized by IR, ^{1}H NMR and Mass spectral analyses.

Research article ○ Abstract only

Assessment of embodied energy of masonry building materials in Hassan, India

R. Devanand, S. Prashanth, Pinky L Devi, B.A. Chethan, … H.N. Harsha
Pages 685-694

Article preview

Abstract

Abstract

The construction sector is putting a lot of effort in reducing its energy, carbon, material, and water footprints, as well as taking steps toward a more sustainable built future. The building materials such as cement, aggregates, masonry units like bricks and blocks constitute to dominant percentile utilization in the construction of building. The activities involved in the production of construction materials will consume large amounts of energy. Hence time has arrived for an effective, environmental friendly, sustainable building material with judicious use of energy. It is therefore important to identify and modify the existing process of manufacture of building construction materials and compute the energy associated

Growth of pyridinecarbothioamides and single crystal XRD studies

C. Revathi, O. Senthilkumar, S. Soundeswaran

Pages 695-699

Article preview

Abstract

Abstract

A series of pyridinecarbothioamides (PCT) are synthesized to produce parrot green crystals. The crystal structure of the compounds was resolved using single crystal XRD technique. It confirmed the formation of monoclinic system with different space groups depending on the position of side chains in the carbothioamide. The 3D structural arrangements show that molecules in the crystal structure are interlinked by N—H … N or S—H … S hydrogen bonding. The conversion of pyridinecarbonitrles to their corresponding pyridinecarbothioamides by the treatment of ammonia and H_2S was confirmed by their mass spectra. Major peak was observed at m/z of 138. Thermogram of PCTs, shows a single step decomposition thereby confirming the melting points of corresponding PCT's as 137 °C, 190 °C, 209 °C respectively. Nuclear Magnetic Resonance (NMR) spectroscopic techniques showed the signals

Research article ○ Abstract only

Prospect of near-infrared quantum dots in the development of tandem solar cells: Detail charge balance study

Uday Das

Pages 700-703

Article preview

Abstract

Abstract

The conventional single-junction solar cells (ex: monocrystalline silicon (cSi) and perovskite solar cells) are limited to 30% efficiency, known as the Shockley–Queisser limit. Due to operational constraints, the single-junction solar cells are transparent to a large part of the near-infrared (NIR) solar spectrum. Harvesting the unused NIR photons in tandem solar cells could be a potential way forward. However, the unavailability of

semiconductors quantum dots (QDs). It is shown here that NIR bandgap QDs can be used to augment the performance of the existing perovskite and cSi solar cells in tandem architecture. Using detailed charge

Research article ○ Abstract only

The effect of Mg-Al substitution, particle size reduction, and thickness of $BaFe_{12-2x}Mg_xAl_xO_{19}$ samples on increasing electromagnetic wave absorption

Erlina Yustanti, Vini Hafidzatul Hakimah, Alfian Noviyanto, Maulana Randa, Maykel Manawan

Pages 704-709

Article preview

Abstract

Abstract

The synthesis of microwave-absorbing materials through a combined destruction process using mechanical alloying and ultrasonic vibration is significant due to its practical, waste-free scalability. Barium hexaferrite is the best candidate for synthesizing radar absorber materials through a combined destruction process. The substitution of Mg-Al on barium hexaferrite and decreasing particle size can increase the absorption of electromagnetic waves. Mixing stoichiometric precursors Sigma Aldrich 99% $BaCO_3$, Fe_2O_3, Al_2O_3, and MgO through wet milling for 20h, followed by sintering at 1200°C for 2h to grow crystal embryos. Mechanical alloying was used to create the single-phase $BaFe_{12-2x}Mg_xAl_xO_{19}$ (x=0; 0.3; 0.5; 0.7). re-milling for 20h and ultrasonic vibration for 2h reduced the particle size of the Mg-Al reinforced barium hexaferrite crystalline material. The increase in Mg-Al substitution in barium hexaferrite does not change the hexagonal structure

Research article ○ Abstract only

Asymmetrical interval Type-2 Fuzzy logic controller based MPPT for PV system under sudden irradiance changes

Nirmal Kumar Pandey, Rupendra Kumar Pachauri, S. Choudhury, Raj Kumar Sahu

Pages 710-716

Article preview

Abstract

Abstract

PV system. The major environmental conditions, i.e., sun irradiance and temperature, are required to harvest maximum energy. One of the most well-known fields of research is power point tracking (MPPT) approaches, which have gained a lot of attention in terms of enhancing maximum power of PV system. Researchers have proposed a variety of topologies for harvesting the most available power namely, Perturb and Observe (P&O), Incremental Conductance (IC) and soft computing-based methods, namely Fuzzy logic control (FLC), Artificial Neural networks (ANN), Adaptive Fuzzy Neural Interface (ANFIS), and

Research article ○ Abstract only

Peak-Shadow-Distance Method for Solar Energy Mapping of Al-Hajar Mountains using Data Mining Techniques

Prabhu Natarajan, Charles Savarimuthu, Najiba Said Hamed Al-Zadjali, Kanagaraj Venusamy
Pages 717-723

Article preview ^

Abstract

Abstract

The Sultanate of Oman, being the founding member of the six-nation Gulf Cooperation Council (GCC) countries of Southwest Asia, is bounded by two sides' water and the other sides by land. Oman is abundant with natural resources. The sources of renewable energy are free as well as cost-effective to extract. During natural calamities like cyclones, the Al Hajar Mountains are under power outages, which results in villages being isolated in the dark for long periods. In addition to that, the undulation of the mountains makes it a burden to connect such villages on a common grid. Satellite images are used to identify the villages and to map the suitable locations for the generation of renewable energy. Based on the environmental criteria, it is observed that the extraction of solar energy is optimal at these locations to fulfill the energy needs. In this paper, an attempt has been made to propose the Peak-Shadow-Distance method for solar energy mapping

Research article ○ Abstract only

Effect of core losses on thermal analysis of 3ϕ- Squirrel Cage Induction Motor using lumped parameter thermal model

S. Sachin, Krishnan Manickavasagam, A.T. Sriram
Pages 724-730

Abstract

Abstract

The proposed Lumped Parameter Thermal Model (LPTM) is complex enough to predict temperatures in most parts of the 3ϕ- Squirrel Cage Induction Motor (3ϕ-SCIM), including the end winding and rotor surface temperatures. It is easily adaptable to a variety of frame sizes because it is formulated using dimensional information and constant thermal coefficients. The solution of linear differential equations adequately describes the thermal behavior of the 3ϕ-SCIM. The application of the thermal model on 15 kW 3ϕ-SCIM is discussed. The rise in temperature at different parts of motor is estimated considering copper loss, constant and variable core loss. The maximum flux density derived from Finite Element Method (FEM) analysis, used to calculate core loss at various loads of a 3ϕ-SCIM. Variable core loss causes deviation in temperature rise, from the results, it is observed that, the relative percentage error considering variable core loss to constant

Research article ○ Abstract only

DPVM-*SEC* based methodology to reconfigure PV system and characterization during PSCs: Experimental study using data acquisition system

Isha Kansal, Rupendra Kumar Pachauri

Pages 731-739

Article preview

Abstract

Abstract

Partial shadowing produces significant hindrance to the efficient use of solar photovoltaic (PV) system. Partial shading conditions (PSCs) reduce PV system performance and show the highly non-linear behavior with respect to power-voltage (P-V) graphs.. A DPVM-*SEC*, 6×4 size array is suggested in the manuscript to reduce the impacts of shadowing on PV arrays. Also, the efficiency of the traditional arrangements, series–parallel (SP) and total-cross-tied (TCT) are analyzed and compared with the dynamic PV module with static electrical connections (DPVM-*SEC*). Various performance indices such as power and voltage at global maximum power point (GMPP), power loss (PL) and fill factor (FF) are evaluated to demonstrate that the DPVM-*SEC* based method is the appropriate configuration for eliminating the shading impacts. Furthermore, an ATmega-328 microcontroller-based data acquisition system (DAS) is developed to measure

Research article ○ Abstract only

Article preview

Abstract

Abstract

This paper deals with the preparation, characterization, and isothermal study on lead removal from synthetic solution using an algae Liagora viscida. The sorption experiments were performed by batch mode of operation and the parametric conditions studied are pH (2–8), contact time (1–180 min), and initial metal solution concentration (20–200 mg/L). The surface morphology of the Liagora viscida has been described using Scanning electron microscopy (SEM). Isothermal study confirmed that the data is well fitted by Freundlich isotherm. In summary, the inexpensive marine algae Liagora viscida proved as an excellent sorbent for lead removal from synthetic solution.

Research article ○ Abstract only

Parametric studies of degradation of reactive red 120 by a novel approach of hydrodynamic cavitation

Litesh V. Malade, Umesh B. Deshannavar, Abhijeet D. Patil, Rahul A. Patil
Pages 744-746

Article preview

Abstract

Abstract

Hydrodynamic cavitation (HC) was used to study the degradation of reactive red 120 (RR120). The effect of several parameters such as RR120 concentration in liquid, operating pressure, system temperature, pH, and the effect of an oxidising agent (H_2O_2) on RR120 % decolorization has been examined. Decolorization of RR120 via hydrodynamic cavitation appears to follow first-order kinetics. Using HC at 3.5 kg/cm^2, 30 °C, pH=2 and 10 mgl^{-1} dye concentration in aqueous solution, 74% decolorization was achieved.

Research article ○ Abstract only

Santosh Mani, Suren Patwardhan, Sameer Hadkar, Krishnakant Mishra, Pradip Sarawade
Pages 747-752

Article preview

Abstract

Abstract

The compound material prepared by dispersing polymer into liquid crystal is of importance due to the improvement in its electro-optical properties. Polymer dispersed liquid crystal (PDLC) is a functional material, of less than micron size liquid crystal, chemically dispersed in a polymer matrix. We report the influences of different concentrations of polymer, on the optical and dielectric behaviour of cholesteric liquid crystals. The fabry perot scattering studies in addition to polarizing optical microscopy were used to study the optical properties. Several novel phases in addition with the known phases were found for the compound materials. The dispersion also results in the large value of dielectric anisotropy which indicates possibility of this material to be used in forming a photo cured network. Our investigation shows a non-zero value of distribution parameter and also increase in dielectric constant, which is useful for display

Research article ○ Abstract only

Frequency regulation analysis for renewable bio generated autonomous multi-microgrid using moth flame optimized fractional order controller

Sadhan Gope, Galiveeti Hemakumar Reddy, Kshetrimayum Millaner Singh
Pages 753-761

Article preview

Abstract

Abstract

Microgrid is considered as an active cell for grid control and management in the modern power system environment. The load frequency control of multi-micro-grid consisting of two micro-grid connected through a tie-line is discussed in these paper. In order to achieve this, a mathematical model is proposed based on renewable energy resources with multi-load perturbations. The proposed microgrid-1 consists of Hydro, variable load, Solar Photo Voltaic (SPV), Bio Gas Turbine Generator (BGTG), Battery Energy Storage System (BESS) and while, the proposed microgrid-2 consist of Battery Energy Storage System (BESS), Solar Photo Voltaic (SPV), Hydro, Biodiesel Engine Generator (BDEG) and variable Load. During a disturbance in

Research article ○ Abstract only

Sonogashira reaction cum cyclization under microwave irradiation supported by sodium aluminate ($NaAlO_2$) and catalyzed by zinc: A green alternative approach in production of furo[3,2-*h*]quinolones

Pritam Saha, Koushik Mukherjee

Pages 762-768

Article preview

Abstract

Abstract

The Sonogashira reaction, characterized by the "formation of C—C bond through cross-coupling a vinyl or aryl halide with an alkyne which is usually terminal," is undoubtedly-one of the most expeditious and prompt reactions in chemical synthesis. The reaction conventionally employs palladium as a catalyst. In addition, co-catalyst such as copper species and an amine or phosphine is generally used. The chemical process takes place in moderate conditions, such as in an aqueous solution, usually at RT, and in the occurrence of mild bases. The reaction is employed to synthesize an array of beneficial products such as heterocycles, mimics of natural products, complex molecules with biological roles, nanomaterials, and above all, synthetic drugs. However, in this study, we aimed to execute this popular reaction using Sodium Aluminate ($NaAlO_2$) as a base and solid support. The reaction is carried out with microwave irradiation

Research article ○ Abstract only

Properties of concrete using waste iron

Khalid Mohammed Breesem, Thaer Jasim Mohammed, Douread Raheem Hassen, Suad Mohammed Heil

Pages 769-773

Article preview

Abstract

Abstract

Iron filings are considered waste products produced from metalworking processes as small pieces of iron that look like fine powder. In this research, the landfill is the method of dealing with this waste. In the current investigation, iron filings have been employed to determine their appropriateness as afine

10%, 20%, 30%, and 40%. The water cement ratio adopted in this work is 0.58. The experimental investigations in the fresh state show that the slump of the mixtures containing 10%–40% of iron filings (IR) varied from 71 to 76 mm. The results showed a decrease in the slump of up to 16.47% for the mixtures

Research article ○ Abstract only

Adsorption of cytosine on Si and Ge doped graphene: A DFT study

Shamsan Ali, Baliram Lone

Pages 774-781

Article preview

Abstract

This study describes how the cytosine adsorption on Si and Ge-doped Graphene uses density functional theory (DFT) calculations. The adsorption energies of cytosine on Si and Ge-doped Graphene are computed. The method used a hybrid B3LYP approach with 6-31G (d,p) and LANL2DZ basis sets to determine the Highest Occupied Molecular Orbital -Lowest Unoccupied Molecular Orbital HOMO and LUMO states and descriptors; and charge distribution potential. According to charge distributions, both Ge-doped and Si-doped graphene structures are sensitive to the cytosine base. The DNA base cytosine plays a crucial role as an adsorbent. When cytosine was adsorbed on Ge- and Si-doped graphene structures, the Highest Occupied Molecular Orbital -Lowest Unoccupied Molecular Orbital (HOMO-LUMO) gap decreased. This finding implies that the electrical conductivity of both systems has increased. The result shows that the Ge- and Si-

Research article ○ Abstract only

A bibliometric analysis on graphene nanoplatelet for Sustainable material

Weng Siew Lam, Pei Fun Lee, Weng Hoe Lam

Pages 782-789

Article preview

Abstract

Graphene nanoplatelet (GNP) has become the focus of researchers in industry and the academics. The adoption of GNP has been widely proposed in medicine, electronics, chemistry and construction over the

listed under materials science, engineering and chemistry. China, United States and India have most contributions on GNP literature while South Korea has the highest citations per paper and citations per cited paper. From the keyword analysis, researchers are still interested in understanding GNP in terms of

Research article ○ Abstract only

Analysis of stress intensity factor of a finite plate with centre crack containing different hole shapes

Amith Anoop Kumar, S. Arunkumar, C.K. Arutselvan, Jenuel John

Pages 790-798

Article preview

Abstract

Abstract

The defects are usually formed in the components during the manufacturing process like for example, voids, microcracks or presence of secondary phase particles. These defects act as stress raisers and increase the severity of stress situation in the component. The structural integrity assessment of such components containing cracks are usually evaluated using fracture mechanics. In components containing flaws, subjected to linear elastic loads, the magnitude of the crack driving force or stress intensity factor (SIF), determines whether fracture occurs or not. In this work, the effect of different hole shapes (circular, square and elliptical) which are introduced in the vicinity of centre crack in a finite plate subjected to tensile load is investigated. The objective is to find out effectiveness of these holes in the arresting the crack growth when they are introduced along and perpendicular to the axis of the centre crack. This is accomplished

Research article ○ Abstract only

Investigations on optical and photoluminescence properties of Dy^{3+} doped zinc tellurite glass

Sukhdev Bairagi, K.S. Bartwal, Ghizal F. Ansari

Pages 799-805

Article preview

Abstract

Abstract

method. The samples were characterized using X-ray diffraction, SEM-EDS, optical absorption and PL spectra. Differential scanning calorimetry (DSC) was carried to determine the glass transition temperature of synthesized samples. The non-crystalline nature of TZND samples was confirmed by XRD measurements and compositions were verified by EDS. Raman spectra have been carried to characterize the architectural attributes of glass matrices. Other parameters of prepared samples as density(ρ), molar volume (V_m), polaron radius R_p, oxygen packing density and intermolecular distance R_i were calculated. The optical band

Research article ○ Abstract only

CFD simulation of circumferential crack in low pressure water pipelines

Subhanil Manna, Akash Kundu, Koustav Dey, Souvik Roy, … Sandip Ghosh

Pages 806-812

Article preview

Abstract

Abstract

Detection of the pipeline leakage and its repair at an early stage is very crucial as leaks can cause significant destruction to the surrounding infrastructures. This paper demonstrates the change in flow characteristics of a low-pressure water pipeline with the existence of a narrow circumferential crack of three different sizes. The steady state simulations have shown clear indications in the velocity and mass flux variations along the pipe and at the crack surface. These results show that the crack causes measurable differences in fluid flow properties at different inlet pressure. Predicted results were analysed to assess the effect of leakage on the pressure field and maximum mass flux. The study intends to contribute in the development of pipe crack leakage detection in various industrial and commercial purposes.

Research article ○ Abstract only

Study of modeling of cyclohexanol and polystyrene polymer solution at T=453.15K and T=493.15K using UNIFAC-FV

Prithwi Raj Nayak, Binay Prakash Akhouri

Pages 813-816

Abstract

This study assesses the utility of the group contribution approach for predicting vapour-liquid equilibrium (VLE) of cyclohexanol (CH,CH_2,OH) in polystyrene(CH_2,ACH,AC-CH) using the universal functional activity coefficients-free volume (UNIFAC-FV). The calculated findings and the experiment show good agreement. The absolute average deviations (AADs) between theory and experiment for the polymer solution i.e., cyclohexanol in polystyrene (M_w=200,000g/mol) at $\boldsymbol{T = 453.5}$ and $\boldsymbol{T = 493.15}$ are found to be 0.012 and 0, respectively for weight fraction activity coefficients and 0.024 and 0.007, respectively, for activity or activities coefficients.

Research article ○ Abstract only

Thickness dependent tungsten trioxide thin films deposited using DC magnetron sputtering for electrochromic applications

Ashok Reddy G V, Habibuddin Shaik, K. Naveen Kumar, R. Imran Jafri, … B.H. Doreswamy

Pages 817-823

Article preview

Abstract

Abstract

DC magnetron sputtering was used to grow tungsten oxide (WO_3) thin films on FTO and corning substrates. SEM, XRD, Electrochemical Analyzer, and UV–Vis Spectrometer were used to analyze surface morphology, structural properties, electrochromic characteristics, and optical characteristics. At an 800nm wavelength, a decrease in thin-film thickness increased optical transmittance from 87% to 95%. Furthermore, coloring efficiency was observed to vary with the thickness of thin films for both 500nm and 375nm are 10.34cm^2 C^{-1} to 18.57cm^2 C^{-1}. In comparison to the high-thickness thin film, the lesser-thickness deposited nano-thin film has a higher diffusion coefficient. At 8×10^{-4} mbar partial pressure, the diffusion coefficients for the smaller and the high-thickness thin film are $7.28x10^{-14}$ cm^2s^{-1} and $6.0x10^{-14}$ cm^2s^{-1}, respectively. The diffusion coefficient and coloring efficiency have been found to have a considerable influence on the

Research article ○ Abstract only

Microstructure evolution and strength development for pozzolana blended cement mortar

Shivang Jayswal, Mahesh Mungule

Abstract

Abstract

Replacement/Blending of cement with pozzolanic materials to reduce clinker content and analyzing its influence on resulting microstructure and strength development is an attempt in enhancing concrete sustainability. Present study compares microstructure development amongst pozzolanic materials with that of reference sample and monitors the process of microstructure evolution. Pozzolanic materials with two different replacement levels (namely 10% and 30%) based on its surface area have been considered. Mortar samples for all considered pozzolanic materials following constant water binder ratio have been studied. Microstructure evolution of the sample is monitored through usage of optical microscope with the pixel resolution of 17.3μm. The observed images have been analysed through image processing tools to understand distribution of intensities, observed shift during evolution process and its comparison with

Research article ○ Abstract only

Growth of cerium oxide nanorods by hydrothermal method and electrochromic properties of CeO_2/WO_3 hybrid thin films for smart window applications

Ashok Reddy G V, K. Naveen Kumar, Habibuddin Shaik, Hitha D. Shetty, ... B.H. Doreswamy

Pages 833-839

Article preview

Abstract

Abstract

Innovative electrochromogenic nanomaterials such as composite materials and also hybrid films can improve electrochromic performance, because of their potential application qualities in electronic, low-power screens, automotive anti-reflect mirrors, and smart windows. In this study, we used a hydrothermal method to used grow the CeO_2 nanorods both with and without HCl added to the solution. And also, DC magnetron sputtering was used to deposit the tungsten oxide films on the cerium oxide nanorods. The surface plasmon effect changes with the size of CeO_2 Nanorods, and this phenomenon influences electrochromic outcomes. The electrochromic characteristics of CeO_2/WO_3 nanostructures on FTO-coated glass are examined in the visible spectrum to use a 0.5M concentration of H_2SO_4 as such electrolyte. At 600nm, these structures produce significant optical modulation (50%) and coloring efficiency (11.60cm^2/C

M. Naga Sireesha, J. Suresh Krishna, V. Vinay Krishna, Ch. Linga Raju

Pages 840-845

Article preview

Abstract

Abstract

Zinc bismuth sodium borate glasses with chemical composition (50-x)Bi_2O_3-30B_2O_3-(x-0.5)ZnO-20Na_2CO_3-(0.5)V_2O_5 [where x = 10, 15, 20, 25] were prepared by melt quenching technique. The prepared samples were studied by means of XRD, EPR, optical absorption and FTIR techniques. The amorphous nature was confirmed by the X-ray diffraction studies. The spin-Hamiltonian parameters (g & A) values, number of spins and paramagnetic susceptibility values have been calculated. The spin-Hamiltonian parameters indicate that the present glass samples are in octahedral sites with tetragonal distortion. The optical absorption spectra of VO^{2+} ions in the present glass system show single absorption band at ≈ 628 nm. The optical bandgap energies (E_{opt}) and Urbach energies (ΔE) have been calculated from the ultraviolet edges. The FTIR spectra reveal the BO, BO_2, ZO, and BO_4 bands in the present glass system

Research article ○ Abstract only

Compressive Strength and Modulus of Poly (dimethylsiloxane)-Hollow Glass Microballoons Syntactic foams reinforced with Nanoclay

Alok Upadhyay, A.V. Ullas

Pages 846-850

Article preview

Abstract

Abstract

Poly (dimethylsiloxane) (PDMS) is an important class of elastomers with diverse applications. However, it lacks the compressive strength required in many engineering applications. The aim of this study is to enhance the compression strength and modulus of poly (dimethylsiloxane). Hollow glass microballoons, possessing less density but higher crushing strength compared to elastomers have been chosen as rigid fillers to enhance the compressive properties of pure PDMS. The prepared syntactic foam is further reinforced with nanoclay (01.-1% v/v). Introducing hollow glass microballoons in pure elastomers significantly enhances the compressive properties, especially specific compressive strength and modulus

Research article ○ Abstract only

Assessment of physical and chemical water quality parameters using naive bayes control algorithm

J. Jeyashanthi, J. Barsana banu, M. Pandi Maharajan, M. Ramuvel

Pages 851-859

Article preview

Abstract

Abstract

In recent decades, one of the challenging issues faced by global nations is the degradation of water resources. Traditionally, water samples are manually collected from different locations to monitor its standards. Such conventional practices incur heavy cost, demand highly-skilled professionals, consume time and produce low precision results. Due to these drawbacks, these techniques are no longer considered to be efficient ones to check the water quality parameters continuously on real-time basis. In this background, the current study designed and developed a low-cost water quality monitoring configuration that can check the quality of water on real-time basis with the help of IoT. The methodology includes the analysis of physical and chemical water quality parameters. Various sensors are used to determine the water quality parameters in the projectedmethod namely, turbidity, conductivity and temperature. The data

Research article ○ Abstract only

Preparation and characterization of graphene oxide nanoparticles derived from wheat straw

Ban Dawood Saleh, Ghazwan Hasan Abdulwahhab, Safaa Mohammad rashid Ahmed

Pages 860-869

Article preview

Abstract

Abstract

This research included the preparation of graphene oxide (WSGO: B3) by the modified Hummer method using wheat straw stalks. The prepared nanoparticles were characterized by physical measurements such as melting point as well as spectroscopic methods such as infrared spectra (FT-IR), atomic force microscopy (AFM), scanning electron microscopy (SEM) and X- ray diffraction (XRD). The characterization techniques were proved that there are apparent differences in the number of layers in nanosheets of graphene oxide.

of sheets is not always direct between the grain size peaks and the number of layers nor the distances

Research article ○ Abstract only

Studies on properties of polymer modified aerated concrete

S. Geetha, D. Sree Varrun, S. Sathya Sudhan, V. Muthuraja

Pages 870-876

Article preview

Abstract

Abstract

In today's world, Precast materials play a vital role in the total construction time of a structure. Some structures use customized materials to be used as precast members. Therefore, altering or optimizing lightweight concrete will help the industry reach new heights. Lightweight concrete is the concrete type that has a density lower than 1200kg/m^3. This lightweight concrete is achieved due to the distributed air voids which are caused by a few aerating agents such as Aluminium powder and Hydrogen peroxide. Pulverized M-Sand is used as the fine aggregate because of the size of the particles which will help to release the oxygen or hydrogen during the chemical reaction between the calcium in the cement and aerating agents. Usually, Aerated concrete types tend to have low strength due to the distributed air voids. Aluminium powder is used as the aerating agent which helps in liberating hydrogen gas when it reacts with

Research article ○ Abstract only

Understanding the role of interfacial transition zone in cement paste and concrete

Kamal Kishore, Radha Tomar

Pages 877-881

Article preview

Abstract

Abstract

Concrete, a heterogeneous material, basically comprises of binder and aggregate of distinct size. Porosity levels around aggregates tend to be greater than in cement paste farther from aggregates, which might lead to a weaker cement paste-aggregate connection. Concrete characteristics are greatly influenced by the interfacial transition zone (ITZ), which accounts for 20% to 40% of the paste and is located near the particles.

qualities of concrete, such as stiffness, strength, and permeability. Therefore, porosity in the ITZ is considered as crucial factor for determining the durability of the concrete. This review article presents the importance of the ITZ, their chemistry and microstructure, consequences of the ITZ, the effect of pozzolana

Research article ○ Abstract only

Effect of various stitching patterns on mechanical properties of jute fiber reinforced composite

R. Gukendran, M. Sambathkumar, T. Prakash Raj, S. Nalinkumar, … B. Sai Pranesh Kumar

Pages 882-887

Article preview

Abstract

Natural fiber composites are found as an interesting alternative material for eco-friendly and cost-effectiveness in comparison to synthetic composites. However, natural fiber composite shows poor interfacial strength and mechanical properties at critical situations due to its weak fiber orientation and weak bonding at the fiber–matrix interface. This study investigates the mechanical behaviour of stitched jute fiber reinforced composite matrix. The composite was made by hand layup method with 40% of jute fiber into epoxy matrix. The jute fibers are stitched by various stitching patterns like square, tilt 45/45, double column stitch and dense rectangular stitch. The assembly of the jute fiber mat is stitched using nylon thread for better control in orientation during the test sample preparation. The test samples prepared from the different stitched composites are tested for its tensile, flexural and impact strength using a

Research article ○ Abstract only

An integrated approach of FEM analysis using DEFORM 3D and experimental investigation of forces developed in Al-Si7Mg

N. Sridhar, M.S. Aezhisai Vallavi, T. Mugilan

Pages 888-895

Article preview

Abstract

Abstract

simulation by finite element analysis (FEM). This research article reveals FEM based simulation model of cutting force in turning of Al-SiCMg. The cutting tool insert has been selected as coated carbide. The simulation was carried out with help of Johnson Hook material model for effective computational method to predict the cutting forces during turning. The result indicates an increase in cutting force with rise in the rate of feed. The predicted force generated during cutting were compared with the experiment results, an

Research article ○ Abstract only

Hydro-biological assessment of sustainable desert Rain-Fed ponds of Western Rajasthan using Physico-chemical characteristics and Phyto-planktonic indices

Abhilasha Choudhary, Sulochana Sharma, Ranveer Singh, Prakash Narayan

Pages 896-903

Article preview

Abstract

Abstract

The present study reports the water quality of small rain-fed water reservoirs of Nagaur district, Rajasthan, India. These surface water bodies are called Talab and Nadis in the local language and play a significant role in fulfilling rural domestic water demands throughout the year from July2020-June 2021. The microfloral investigations of these ponds were neglected in the past. So, investigation is needed for water quality checks to improve the use of storage water strategy. The water samples were collected from July 2020 to June 2021 from selected four sampling ponds located in and around Nagaur city in nearby villages for Physico-chemical and phytoplankton analysis once in a month. Physical and chemical parameter were determined such as odour, pH, Total Dissolved Solid (TDS), Total Hardness, carbonate and bi-carbonate hardness and Total Alkalinity with organic parameter BOD, COD and organic matter by following the

Research article ○ Abstract only

Tribo-performance of saw dust filled natural fiber – Glass fiber reinforced epoxy composites: Modelling and optimization

Debrup Sarkar, Pranjal Borah, Sutanu Samanta, Nabam Teyi, … Roktutpal Borah

Pages 904-910

Abstract

Abstract

The tribological behaviour of a hand-layup jute/glass hybrid epoxy composite with saw dust filler was investigated. On the pin-on-disc tribology testing machine, the wear properties of the fiber reinforced composite were investigated. This study looked at the effect of natural filler, specifically saw dust, on the wear behaviour of glass, jute and epoxy hybrid composites.RSM was used to create a regression model with independent variable wear loss and coefficient of friction as a function of dependent variables sliding speed, amount of filler, and applied load. The Taguchi method with L_9orthogonal array was used to determine the best input parameter values for minimizing the wear loss and friction coefficient. The signal-to-noise (S/N) ratios were evaluated using the “smaller-is-better” principle. An ANOVA was performed to determine how much each of the input factors influenced the output responses

Research article ○ Abstract only

Effect of laser cutting on mechanical performance of woven glass fiber reinforced plastic composites

Md Mijanur Rahman, M Muzibur Rahman

Pages 911-917

Article preview

Abstract

Abstract

The present study is an attempt to investigate the effect of laser cutting on the mechanical performance of woven glass fiber reinforced plastic (GFRP) composites. The composite material is fabricated by combining woven glass fiber cloth and epoxy resin with hardener. Then the GFRP composites are both mechanically cut and laser cut to prepare samples for mechanical performance testing. Prepared samples are tested as per respective ASTM standards to find tensile, flexural and hardness behaviors. Scanning Electron Microscope (SEM) micrographs of the machined surface and tensile fractured surface are analyzed concerning surface integrity and fracture characteristics. Finally, the results of the above tests are compared to find out whether mechanical cutting or laser cutting leads to superior mechanical performance of GFRP. Mechanical performance tests indicate that tensile and flexural properties are superior in mechanically cut

Research article ○ Abstract only

Jagadeesh Bhattarai
Pages 918-924

Article preview

Abstract

Abstract

The efficacy of W, Sn, and Sb in Mn-Mo-O-based electrocatalysts explore their catalytic properties of oxygen evolution effectiveness, stability, and durability for hydrogen-energy production from saline water electrolysis. The composition, phase, and surface morphology of the electrodeposited Mn-Mo-X-Y-Z-O (X=W; Y=Sn; Z=Sb) electrocatalysts on the Ir-sn-Sb-O/Ti (TMO) electrode were investigated using X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), and confocal scanning laser microscopy (CSLM) techniques. The catalytic properties of the materials were studied using iodometrically and galvanostatic polarization methods in saline solution with 3% NaCl in acidic (pH 1) conditions at room temperature (25°C). Three sets of nano-phase Mn-Mo-X-Y-Z-O electrocatalysts are fabricated first time, which play significant roles in the production of sufficient amounts of hydrogen from saline water electrolysis. The

Research article ○ Abstract only

Prioritization of forging die design criteria based on failure analysis using fuzzy analytic hierarchy process (FAHP)

Abhishek Sharma, V M S Hussain, P. Abhishek Kumar, Manish Pandit
Pages 925-932

Article preview

Abstract

Abstract

Design of forging dies involves various design criteria starting from selection of material to finisher design. These design criteria decide the failure and life of the dies. So, for better design of dies it is sometimes inevitable to prioritize one design criterion over other. In general, the prioritization is done based on the expertise of the design engineer which is not always reliable. So, it is important to decide which criteria is preferred over the other. The prioritization of criteria can be done using analytical methods. In the present work, the design criteria are prioritized using analytical hierarchy process (AHP). The prioritization is further improved by fuzzification (fuzzy analytical hierarchy process – FAHP) to included intermediate

Research article ○ Abstract only

Dielectric relaxation studies in WO_3 mixed lead vanadate glasses

Mohansingh H, Sankarappa T, Amarkumar Malge, Ashwini Devidas, B Raghavendra

Pages 933-936

Article preview

Abstract

Abstract

Vanadate glasses mixed with lead and tungsten oxides in the composition, $(V_2O_5)_{0.6-x}–(PbO)_{0.4}–(WO_3)_x$, x =0.1, 0.15, 0.20, 0.25 and 0.3 were produced by quenching the hot melt. XRD spectra of the samples confirmed their non-crystallinity. The samples were measured for dielectric properties for frequency range 50Hz–15MHz and temperature 300K-500K. The dielectric constant and loss were observed to be varying from $3.70x10^4$ to $4.75x10^2$ and from $4.91x10^6$ to $0.15x10^{-2}$ respectively. Decreasing trend with frequency and increasing trend with temperature have been noted in both constant and loss. The cole–cole plots indicated single semiconducting phase of the samples. Activation energy for dc conductivity that was derived from impedance is found to increase with tungsten oxide content. Analysis of both impedance and modulus yielded almost the same dielectric relaxation time and activation energy. Relaxation mechanism is

Research article ○ Abstract only

Process parameters and their effect on the structure and morphology of gadolinium-doped ceria

Taranveer Kaur, K. Singh, Jayant Kolte

Pages 937-941

Article preview

Abstract

Abstract

Gadolinium doped ceria $Ce_{1-x}Gd_xO_{2-\delta}$ (x=0 and 0.20) materials have been synthesized by ultrasound-assisted sol–gel combustion method for intermediate temperature solid oxide fuel cells. Gd^{3+} cations substitution in cerium oxide produces oxygen vacancies. The presence of these vacancies can alter the properties of doped ceria. The thermal analysis of the samples predicted the calcination temperature of the powders to be at 500°C. The samples calcined at 500°C have a cubic fluorite crystal structure. The change in

gadolinium cation. The synthesized powders show well-defined grains with smaller crystallite sizes. These

Research article ○ Abstract only

Effect of pH on the structural and optical properties of cobalt oxide nanoparticles synthesized by hydrothermal method

R.B. Chrisma, A.V. Avani, E.I. Anila

Pages 942-946

Article preview

Abstract

Abstract

The paper focuses on the synthesis and characterization of cobalt oxide nanoparticles synthesized under different alkaline pH of the precursor solution by hydrothermal method. Cubic spinel Co_3O_4 crystallites were observed by X-ray diffraction pattern (XRD) and Raman spectrum. The crystallite size decreases as the pH value increases. The absorption spectrum exhibited two broad bands which are in good agreement with the cobalt oxide band structure. The change in bandgap was observed with pH of the precursor solution in agreement with size effects. Photoluminescence (PL) spectra consist of a broad emission with different peaks which are due to point defects.

Research article ○ Abstract only

ZnO codoped with Si and Mn – Preparation, characterization and photocatalytic reduction of hazardous chromium (VI) by the codoped ZnO

N. Amal, M. Athira Chandran, K.M. Sreekanth, G. Sivasubramanian, … K.M. Sreedhar

Pages 947-951

Article preview

Abstract

Abstract

Zinc oxide-silicon dioxide nanocomposite, doped with manganese, was blended by chemical co-precipitation mode. Its structural properties, surface morphology, and optical properties had been probed by X-ray diffractometer, field emission scanning electron microscope then ultraviolet–visible

amount of manganese ions. Chromium (VI) is hemotoxic, genotoxic besides carcinogenic. The doped nanocomposite was tested for photocatalytic conversion of hazardous chromium (VI) to chromium (III) under ultraviolet besides sunlight. Best result for chromium reduction was achieved in 30 min with 10 %

Research article ○ Abstract only

Influence of ALR on SMD in 3-D air-blast atomization using CFD

Rajneesh Kumar Yadav, Vivek Kumar Patel

Pages 952-957

Article preview

Abstract

Abstract

In this paper, the performance of an air–water coaxial injector is investigated numerically to see the effect of ALR (Air to Liquid mass Ratio) on SMD (Sauter Mean Diameter) using ANSYS FLUENT. The simulation has been performed over a wide range of air velocities (155 m/s –190 m/s) and ALR (14 – 18), keeping the mass flow of water constant. The cross-sectional flow areas of water and air and other parameters are kept constant except for air velocity, as air velocity is directly related to mass flow rate. The highest atomization of water particles is observed at 190 m/s velocities of air, and SMD was also minimum at the same velocity as they are both mutually interrelated. SMD will also be dependent on Reynolds Number (Re), and Weber number (We) as Reynolds is related to velocity, and weber number is related to surface tension. $\mathbf{SST\,k-\omega}$ turbulence model is used to solve the RANS (Reynolds Average Navier Stokes) equation

Research article ○ Abstract only

Ammonia sensing performance of Ni doped-WO_3 nano particles prepared by simple hydrothermal method at room temperature

H. Lincy, P.C. Jobe Prabakar, S. Joshua Gnanamuthu, I. John David Ebenezar

Pages 958-964

Article preview

Abstract

Abstract

investigated and confirmed by XRD, SEM, TEM, UV-Vis and FTIR. The results proposed that 0.75 wt% Ni doped WO_3 (NW3) exhibited excellent response towards ammonia gas at the calcining temperature of 550°C with good response time of 36 *sec* also with rapid response – recovery time of 36–100s even at room temperature.

Research article ○ Abstract only

Effect of thick film coating on scratch resistance of aluminium 6082-T6 alloy under varied loading conditions

M.S. Tippeswamy, K.V. Arun, Shankara Naik

Pages 965-971

Article preview

Abstract

Abstract

This experimental investigation is devoted to the analysis of computerized data of thick film coated aluminium 6082-T6 specimens under scratch test for different types of loads. Experimentation have been carried out on TiAl, WC-Co and NiCrAlY coated samples. For all the coated samples Ni-Cr bond coat has been used. The scratch width and scratch hardness of these coated samples were determined under constant load sets over fixed stroke length. Scratch test were carried out in accordance with the ASTM G-117 standards. Tests were also performed under step and ramp loads for the same stroke lengths to examine the nature of coated failure. Results of the scratch tests have shown that, the coating thickness and the range of loads play a significant role on the cohesive and adhesive nature of failure. It is identified that, for all type of loading, scratch hardness is found to be high in NiCrAlY coated samples. The nature of fracture

Research article ○ Abstract only

Performance evaluation of one dimensional electrokinetic barrier subjected to saltwater intrusion: A laboratory scale study

Abhishek A. Sutar, Veerabhadra M. Rotte

Pages 972-980

Article preview

Abstract

its aspects. Many rural areas around the world still lack access to clean drinking water. On the other hand, increase in urbanization, changes in industrial and agricultural activity, and tourism development in coastal areas have pushed the extraction of groundwater resources to their limits. One of the main issues faced by coastal community is the intrusion of saltwater into fresh groundwater aquifers due to overuse of coastal freshwater supplies. In this direction the electrokinetic barrier can prove to be a feasible solution for preventing saltwater intrusion. The main goal of this research is to create an electrokinetic barrier that allows salt water to flow while reducing the concentration of Na+and Cl- ions in order to achieve better quality water that meets drinking and/or irrigation standards. This paper describes laboratory scale

Research article ○ Abstract only

Synthesis and intense visible emission of Er^{3+}/ Yb^{3+} ions codoped lithium tellurite glasses under UV and IR excitation

Shivangi Parashar, Kratika Parashar, S.K. Mahajan

Pages 981-984

Article preview

Abstract

Abstract

The tellurite glasses doped Rare-Earth (RE) oxide with the optimum composition of (70-x)TeO_2-15Li_2O_3-13WO_3-2Yb_2O_3-xEr_2O_3 (TWLYEO) were synthesized using the conventional method and these glasses are studied by absorption, emission spectra, decay measurement. The existence of the absorption band of Er^{3+} ions excited states has been confirmed by absorption measurement which indicated that possible corresponding energy transitions are available for Er^{3+} ions. Intense blue and green emission of TWLY2EO glass doped with 2 mol% of Er^{3+} ions have been observed by UV light at 380 nm excitation. Also, under 800 nm excitation produced the most intense band of green emission $^2H_{11/2} \rightarrow {}^4I_{15/2}$ and the secondary-one is red emission $^4F_{9/2} \rightarrow {}^4I_{15/2}$ with other emission peaks weaker than the two. Raman spectra indicated that glass consists of TeO_4 and TeO_3/TeO_{3+1} units for internal network structure. Further, the room temperature

Research article ○ Abstract only

Evaluation of emission characteristics & performance of a biogas-biodiesel dual fuel engine using blends of butanol in different ratios

Dilsher Khan, Geetesh Goga

Abstract

Abstract

Several researches are being conducted currently worldwide so as to reduce the atmospheric pollution because of the fossil fuels. One of the successful methods is to blend the oxygenated fuels & biogas with the conventional fuel which can reduce the emission of unburnt particles of CO_x, SO_x & NO_x because they are the main constituents responsible for major air pollution. One such effort has been made in the current paper where the mixture of pure Diesel, Biodiesel & butanol in different ratios is used as the fuel. For preparing the fuel, 20% palm oil-based biodiesel is initially mixed with 80% pure diesel & the mixture is named as BD20. In the next phase, 95% BD20 is mixed with 5% butanol and the mixture is termed as B5. Similarly, by adding 10% butanol in 90% BD20, 15% butanol in 85% BD20 & 20% butanol in 80% BD20, B10, B15 & B20 blends have been prepared. Biogas is made to flow inside a single cylinder CI engine (4-stroke) at

Research article ○ Abstract only

Experimental investigations of machining parameters on polyamide 6 using single point incremental forming

Aditya Kharche, Shivprakash Barve

Pages 993-1001

Article preview

Abstract

Abstract

The single point incremental sheet forming method includes characteristics that can adapt to a wide range of applications and needs. Incremental forming might have undesirable quality if process parameters are not properly set. A simulation software ABAQUS was used to perform single point incremental forming of polyamide 6 by varying parameters such as tool rotational velocity, feed rate, feed per revolution, and wall angle to investigate their influence on the thickness thinning and geometric accuracy of the formed component.

Experimentation was performed using a 3-Axis Numerical Control Milling Machine to study the different defects occurring throughout the process. The investigation was performed on a 100mm×100mm flat

nanomaterials for its application in hydroelectric cell with other areas of science & technology

Aniket Manash, Rakesh Kumar Singh, Vivek Kumar, Jyoti Shah, … R.K. Kotnala

Pages 1002-1013

Article preview

Abstract

Abstract

The present research work is based on the effect of Li^+ substitution in $MgFe_2O_4$ nanomaterials corresponding to changes in their various properties at nanoscale. The Li^+ substituted $MgFe_2O_4$ nanomaterials were prepared by sol–gel method at low annealing temperature of 550 °C for 2 h. The production of a pure crystalline phase of $MgFe_2O_4$ with cubic spinel structure was explained by XRD analysis (*Fd*-3 m space group). XRD study with cubic spinel structure revealed Li^+ replaced $MgFe_2O_4$ samples with varying concentrations. The average crystallite size and X-ray density of entire samples $Mg_{1-x}Li_xFe_2O_4$ (x=0, 0.1, 0.2, 0.3 and 0.4) were found using Scherer's equation between 24.28 and 36.18 nm and 4.335–4.497 g/cm^3, respectively. The crystallite size was noticed to decrease with an increase in Li^+ concentration. For pure and Li^+ substituted (x=0.4) $MgFe_2O_4$ of XRD data, Rietveld refinement was used to

Research article ○ Abstract only

Theoretical predictions of thermophysical properties of BiSn liquid alloys at 600 K

Rajendra Prasad Chaudhary, Rupam Kumari, Nitu Kumari, Jagdhar Mandal, Indu Shekhar Jha

Pages 1014-1021

Article preview

Abstract

Abstract

Self association model has been utilized to study the concentration dependence of the thermophysical properties of BiSn liquid alloys at 600 K. In the framework of self association model, the expressions for the thermodynamic properties like the free energy of mixing, thermodynamic activities, entropy of mixing and heat of mixing, and structural properties i.e. concentration fluctuations in the long wavelength limit and short—range order parameter have been derived. Using the experimental data of the free energy of mixing, the model parameters such as interaction energy and the ratio of the self associates have been estimated. In order to maintain the consistency, the same values of model parameters have been used to compute the

Research article ○ Abstract only

Effect of transport layer thickness in lead-based perovskite solar cell: A numerical simulation

Sadnan Sakib, Muhammad Yusof Mohd Noor, Mohd Rashidi Salim, Ahmad Sharmi Abdullah, … Mohd Haniff Ibrahim

Pages 1022-1026

Article preview

Abstract

Abstract

This paper simulates and compares the performance of three metal oxides as electron transport layer (ETL) in planar *n*-i-p lead halide perovskite solar cell (PSC). By applying a 1-dimensional numerical software (SCAPS 1-D), titanium dioxide (TiO_2), zinc oxide (ZnO) and tin (IV) dioxide (SnO_2) have been opted as ETL with nickel oxyhydroxide (NiOx) as the hole transport layer (HTL). Detailed analyses are presented for fill factor (FF), open circuit voltage (V_{OC}), short circuit current (J_{SC}) and power conversion efficiency (PCE) for thickness variation of methylammonium lead iodide ($CH_3NH_3PbI_3$) or $MAPbI_3$ absorber layer. The thickness of perovskite absorber layer has been varied from 100 nm to 1500 nm with optimum PCE are recorded at 600 nm for all metal oxide candidates. At 80 nm thickness of both HTL and ETL, it is observed that SnO_2 produced the highest PCE value of 17.5%, followed by ZnO (17.13%) and TiO2 (16.33%). Meanwhile, the

Research article ○ Abstract only

Influence of temperature on oxygen adsorption/desorption properties of NEG materials

K. Surendra, G.V.V. Satyanarayana, K. Prabhudas, D.Ch. Rajubabu, A.D.P. Rao

Pages 1027-1031

Article preview

Abstract

Abstract

Highly porous alloys or powder materials of Ti, Zr, Al, V, Fe and other metals are considered the base materials for non-evaporable getters (NEG) as these contain various applications. Earlier researchers investigated and reported the sorption characteristics of the Ti-Co, Ti-Zr-V, and Zr-V-Fe getter materials. Hence, the present studies focus on examining temperature impact on structural behaviour, phase changes, and oxygen sorption process of NEG materials. Two series of NEG materials have been taken different

Materials are expected to show phase changes at elevated temperatures. Thus, XRD spectra have been

Research article ○ Abstract only

Performance optimization of electrically variable double gate junctionless transistor with HfO_2 gate dielectric

Achinta Baidya, Lalchhuanawma Ralte, Lalramnunmawia Khawlhring, Zosangzeli, … Niladri Pratap Maity

Pages 1032-1037

Article preview

Abstract

Abstract

A non-traditional novel structure of electrically variable double gate nano-scale junctionless transistor is proposed. Simulation study of the proposed structure is performed to understand its performance. Variation of the gate voltages are done to demonstrate the effect of variable gate in the performance of the device. Analysis of the structure shows that improvement in transconductance can be achieved in subthreshold region with the variation in side gate voltages. Independent change in side-gate voltage near the drain and source also shows satisfactory results. Improvement in transconductance, threshold voltage will be suitable for the use of the structure in subthreshold region for circuit application. Variation in side gate length and main gate length are also done for analysis of the proposed gate structure.

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GC-RASM 2022

2022 Second Global Conference on

Recent Advancements in Sustainable Materials (GC-RASM 2022)

Book of Abstracts

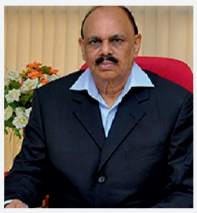
28 - 29, July 2022

A.J. Institute of Engineering & Technology

Mangaluru, Karnataka, India.

Publication Partner

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Dr. A J SHETTY

President
A.J. Institute of Engineering and Technology,
Mangaluru, Karnataka, India.

Message

I am enraptured to note that A J Institute of Engineering & Technology in heading the Second Global Conference on Recent Advancements in Sustainable Materials (GC-RASM 2022) on 28th and 29th of July, 2022.

Conference will have research papers presented from different Academician Industrial Houses, Research Institutions situated across different part of the world such as Bangladesh, Brazil, Ecuador, Indonesia, Iraq, Malaysia, Mexico, Nepal, Nigeria, Oman, Saudi Arabia and Taiwan etc.

It would provide platform to premier interdisciplinary for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the respective fields.

I convey my good wishers for successfully conducting of the conference and congratulate one and all for the successful effort put across for arranging the conference in AJIET Campus, Mangalore, India.



PRASHANT SHETTY

Vice President
A.J. Institute of Engineering and Technology,
Mangaluru, Karnataka, India.

Message

It is my pleasure to learn that A J Institute of Engineering & Technology is organizing Second Global Conference on Recent Advancements in Sustainable Materials (GC-RASM 2022) in our campus on 28 - 29 July, 2022.

GC-RASM 2022 will showcase the latest research and development in the key areas related to the Materials science and Engineering. Such events are essential to inspire research students and faculty members and further improve the quality of education, provide continuous learning opportunities for professionals, and allow exchange of ideas and promote collaboration.

I applaud the initiative by the organising committee in taking up the responsibilities of organising the conference. I also congratulate the members of the Editorial Board and all participants who have contributed their role in submitting research papers to the proceedings.

I urge all the participants to make optimum use of the opportunity to learn what is new in your field and its broader areas emerging globally. My best wishes for a fruitfully successful event

Message



Dr. SHANTARAMA RAI C.

Principal
A.J. Institute of Engineering and Technology,
Mangaluru, Karnataka, India.

It is my great pleasure to host the very Second Global Conference on Recent Advancements in Sustainable Materials (GC-RASM 2022) on 28th and 29th of July, 2022 at A J Institute of Engineering & Technology, Mangalore.

The conference offers an open forum for innovation in material science as well as materials designing controls along with the capacity of taking care of multi-disciplinary issues in various divisions of the economy – Indexed in CPCI – web of science and GC-RASM 2022 by Material Today Proceeding (MTPR) - an Elsevier Journal.

On behalf of AJIET Fraternity, I extend a hearty welcome to all the delegates and participants from in and around the country to this conference. I assure that this conference will be highly beneficial to students, scholars, entrepreneurs, institutions, industry and the society as a whole. I am sure this conference will serve as an opportunity for delegates to gain quality input for on-going as well as future research.

Message



Dr. SANGEETHA D.M.
Convenor, GC-RASM 2022
A.J. Institute of Engineering and Technology,
Mangaluru, Karnataka, India.

Materials science and engineering is one of the prominent sector creating a revolution in the modern era. The technological developments in the materials science paves the road for advancements in materials science and manufacturing technology across the world. The developments in the field of computer and communication technology upheaved the manufacturing sector by incorporating Intelligent Manufacturing System which is more advanced and precise. The innovation in material science and computer technologies has the capacity of taking care of multi-disciplinary issues in various divisions of the economy.

Around 700 research papers were received for the conference within India and around the world. All the papers were critically reviewed and around 225 were shortlisted for oral presentation with a 36% acceptance ratio. All the abstract of the technical papers are compiled to formulate this volume. The manuscripts covers almost all the areas of Engineering science and technology. All the technical papers will be published by Scopus Indexed Journal – Material Today Proceedings – CPCI Web of Science Indexed Journal. This platform provided a great opportunity for researchers from various universities and institutions to interact and exchange ideas future scientific endeavours.

I am grateful to all contributors who have presented their valuable work during this conference. I am also thankful to the editors of journals MTPR for accepting to publish the selected papers of conference.

I thank International advisory members, reviewer committee member's, editorial board members and technical committee member's for their constant support to make this conference a grand success.

I whole heartedly extend my deep concern and heartfelt thanks to the Management, Principal, Head of all departments, faculty members, staff members for their constant support and encouragement for successful completion of this conference.

I wish all the success for the two days Global Conference GC-RASM 2022 and its deliberation.

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RASM 1008 Concrete Using Waste Iron Fillings
Khalid Mohammed Breesem, Thaer Jasim Mohammed,Douread Raheem Hassen, Suad Mohammed Heil *002*

RASM 1019 Ammonia sensing performance of Ni doped-WO_3 nano particles prepared by simple hydrothermal method at room temperature
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RASM 1022 Effect of diesel engine modification operated with karanja biodiesel and its blends
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Abstract : Bubble Deck Concrete is a unique kind of plate utilized in house constructing, that Dane Jorgen Bruening has presented. The thought conceivable to make a transporter of concrete, the exhibitions are more adaptable space structures and by and large known and the legacy of the cutting edge spaces. The BDS lessen or change the substantial inside the center of the chunk by a lighter material or balls to from decrease the own load from the design. In the spot of inert cement supplant the Polypropylene hollow balls, they can be decrease the heaviness of the Bubble Deck Concrete and carbon dioxide emanations and diminishes the 20% of cement in different parts i.e the Bubble Deck slab dead weight reduces then itself reduce the column and foundation sizes then, at that point, naturally diminishes the slab weight. The BDC is likewise called as Green concrete in light of the fact that the BDC is diminishes the natural effect of concrete and furthermore utilizing the waste material. In light of the above terms, the expense of the BDS Structures is less when contrasted with Traditional concrete or Conventional concrete. In the current examination, 100% cement and % 35 Fly Ash is replace by the weight of the cement in concrete with water/ binder ratio 0.45 of various grades M20, M25 a M30 of Conventional concrete cubes (CCC) and Bubble Deck concrete cubes(BDCC) and Conventional Fly ash concrete cubes (CFACC) and Bubble deck Fly ash concrete cubes (BDFACC) . The conduct of this Conventional concrete and Bubble Deck concrete read up for properties like % of Weight reduction and Compressive strength for 28 days,90 days ,180 days and 360 days by use of 30mm, 60mm and 90mm Polypropylene hollow balls in Bubble deck concrete cubes(BDCC) and Bubble deck Fly concrete cubes (BDFACC).

Keywords: Conventional concrete cubes (CCC) , Bubble Deck concrete cubes(BDCC), Conventional Fly ash concrete cubes (CFACC), Bubble deck Fly ash concrete cubes (BDFACC)

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Electrical study of bismuth and zinc codoped yttrium oxide prepared by wet chemical method

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Abstract : Important applications of yttrium oxide are in the field of optoelectronic devices based on their optical properties and memory devices and high frequency devices based on their electrical properties. Yttrium oxide can act as the best host lattice for phosphor applications and dielectric material as are placement of SiO_2.Bismuth and zinc codoped yttrium oxide samples are synthesized by simple precipitation technique, we t chemical method and its structural, elemental and electrical properties are analysed for their possible applications. It was found to have no loss in the high frequency region.

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Concrete Using Waste Iron Fillings

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Abstract : Iron filings are considered waste products produced from metalworking processes as small pieces of iron that look like a fine powder. In this research, The method of dealing with this waste is the landfill. In the current investigation, iron filings have been employed to determine their appropriateness as a fine aggregate in concrete production. Replacing all or a portion of the fine aggregates with iron filings would result in significant environmental benefits. The replacement percentages of fine aggregate by IR are 0%, 10%, 20%, 30%, and 40%. The water cement ratio adopted in this work is 0.58. The experimental investigations in the fresh state show that the slump of the mixtures containing 10%–40% of iron filings (IR) varied from 71 to 76 mm. The results showed a decrease in the slump of up to 16.47% for the mixtures containing different percentages of IR compared to the reference mixture. This decrease is evident in mixtures that contain IR ratios of between 20% and 40%. However, the super plasticizer (SP) addition improved each of the slump and compaction factors. The compressive strength of the mixtures containing 10%–40% was within the range of (28.21 to 40.44) MPa at the age of 28 days, and the flexural strength was within the range (4.51 to 6.51) MPa at the age of 28 days. According to the results of this study, the addition of IR decreased the compressive strength and flexural strength by up to 38.51% and 44.32 percent at the age of 28 days, respectively. The importance of the study comes from the attempt to reuse waste iron filings as fine aggregate to save sources of our environment and contribute to the sustainable concrete industry.

Keywords: iron filings, fine aggregate, disposal, compressive strength, superplasticizer.

1019

Ammonia sensing performance of Ni doped-WO_3 nano particles prepared by simple hydrothermal method at room temperature

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Abstract : This present work aimed to synthesis Ni doped WO_3 nano particles with different doping concentration by hydrothermal method and examined as effective gas sensing materials for detecting VOC's. The physio chemical properties and the effect of ammonia sensing characteristics of prepared nano particles were investigated and confirmed by XRD, SEM, TEM, UV- Vis and FTIR. The results proposed that 0.75% Ni doped WO_3 (NW3) exhibited excellent response towards ammonia gas at the calcining temperature of 550ºC with good response time of 36 sec also with rapid response – recovery time of 36 – 100s even at room temperature.

Keywords: Hydrothermal method, WO_3, nickel, Gas sensors, ammonia, calcining temperature

1020

Green Synthesis of ZnO nanoparticles using *Plectranthus Amboinicus* leaf extract and Study their Characterization, Antibacterial Activity

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Abstract : The use of plant extract in the synthesis of nanostructured materials can be a cost effective and eco-friendly approach. The leaf extract of *Plectranthusamboinicus*was used as reducing and stabilization agent for synthesizing ZnO Nanoparticles. The synthesized ZnO Nanoparticles were characterized by dynamic light scattering (DLS), Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), UV–Vis spectroscopy, Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX).The UV–Vis absorption maxima showed peak near 377 nm, which is characteristic of ZnO nanoparticles. DLS data showed that single peak is at 11 nm (100%) and Polydispersity Index is 0.375. XRD analysis showed that these are highly crystalline ZnO nanoparticles having an average size of 42 nm. The biosynthesized ZnO Nanoparticles underanalyze the antibacterial activity both gram positive and gram negative bacteria such as *Staphylococcus epidermis, Bacillus subtilis* and *Escherichia coli*.

Keywords: ZnO, UV –Visible, XRD, FT-IR ,DLS,SEM and Antibacterial activity;

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Effect of diesel engine modification operated with karanja biodiesel and its blends

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Abstract : Growing attention in studying renewable and alternate fuels for internal combustion (IC) engines has been increased by concerns about improving engine performance while reducing emissions to satisfy EURO standards and to fulfil increasing energy demands for a growing population. Biodiesels are a possible replacement to diesel fuel since, they are renewable and have qualities similar to fossil diesel. For diesel engines, biodiesel generated from Karanja oil is a better diesel substitute. The use of alternative fuels in a CI engine reduces performance while also increasing hydrocarbon (HC) and carbon monoxide (CO) pollutants. However, making the engine entirely adiabatic by combining biodiesel with diesel and applying thermal barrier coatings (TBC) to the piston, cylinder wall, and inlet and outlet valves will improve overall engine performance. In light of this, TBC diesel engine components coated with partly stabilized zirconia (PSZ) and aluminium oxide (Al_2O_3) ceramics were tested in a diesel engine using Karanja oil methyl ester (KOME) and its mixtures. Both diesel and KOME and its blends had their braking thermal efficiency (BTE), specific fuel consumption (SFC), HC and oxides of nitrogen (NOx) emissions measured before and after coating, and the obtained results were matched. Engine performance is nearly comparable with acceptable emission requirements while using B20 powered biodiesel and a PSZ coated engine.

Keywords: Karanja oil, biodiesel blends, Performance, Emissions.

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Sonogashira Cross Coupling and Cyclization Reaction Under Microwave Irradiation supported by Sodium Aluminate ($NaAlO_2$) and catalyzed by Zinc: A Green Alternative Approach

For One-Pot Tandem Synthesis of Furo[3,2-h]quinolines

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Abstract : The Sonogashira reaction which is characterized by "formation of a C–C bond by cross-coupling a vinyl or aryl halide with a terminal alkyne", is undoubtedly one of the most useful and efficient reactions in chemical synthesis. This reaction employs palladium as a catalyst. In addition, the use of co-catalyst such as copper species and an amine or phosphine is used in general. The reaction takes place in moderate conditions, such as in aqueous solution, at room temperature, and in the presence of mild bases. This reaction is employed for the synthesis of an array of beneficial products such as heterocycles, mimics of natural products, complex molecules with biological roles, nanomaterials, and above all synthetic drugs. However, in this study, we aimed at executing this popular reaction using Sodium Aluminate ($NaAlO_2$) as a base and solid support. The reaction is carried out with the aid of microwave irradiation using zinc as a catalyst. Therefore, this protocol eliminates the need of palladium as a catalyst, phosphines or amine as a base, and copper as a co catalyst. These modifications hold great importance in terms of making reactions more atom-friendly and implementing green chemistry principles. In this connection, we developed a newer energy, cost and time efficient protocol for coupling and cyclization of acetylenic 8-quinolinols produced in situ by the microwave-based Sonogashira cross-coupling reaction. These essential replacements in the methodology helped us to achieve an affordable and clean-energy synthesis protocol.

Keywords: Sonogashira reaction, Sodium aluminate, green technology, microwave irradiation, zinc catalyzed.

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Environmentally Benign Synthesis of 2,3,7-Substituted 1,8-Naphthyridines Devoid of Catalyst

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Abstract : A series of 1,8-Naphthyridines were synthesized from the starting material, **2-aminonicotinaldehyde (or** 2-amino-pyridine-3-carboxaldehyde), using reusable eco-friendly PEG: 400 solvent via Friedlander annulation. These compounds were synthesized in catalyst free conditions with shorter reaction times. The compounds obtained were in good yields and characterized by spectral analyses like IR, ^{1}H-NMR and Mass.

*Keywords: **2-aminonicotinaldehyde**; PEG: 400; Friedlander annulation; Green synthesis; Naphthyridines.*

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Photocatalytic Activity of *Hibiscus* Leaf Extract Mediated ZnO Nanoparticles by Hydrothermal Method

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Abstract : *Hibiscus* leaf extract mediated ZnO nanoparticles have been prepared through a hydrothermal method and the effects of extract doping on the structural, optical and electronic properties of ZnO NPs were studied. The photocatalytic oxidation of methylene blue dye under visible light irradiation was used to determine the photocatalytic performance of the prepared nanoparticles. The extracted ZnO nanoparticles (R3) exhibited the lowest band gap and the highest photocatalytic activity for the methylene blue dye. The photocatalytic performance of the (R3) prepared ZnO nanoparticles was stable after the nanoparticles were reused five times for the oxidation of methylene blue dye.

Keywords: Hibiscus, Zinc Oxide, Green synthesis, hydrothermal;

1033

Parametric Study of Abrasive Jet Machining on Zirconia

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Abstract : Abrasive jet machining (AJM) is an effective non-conventional technique of machining where abrasive particles strikes the work piece with top velocity causing little fractures and separated segments are carried away by flowing air. The necessity of the development of such type of machining process is the advancement of materials that are being used in industries. In this paper, the design and assembly of in-house AJM setup along with its various indigenous subparts like compressor, mixing chamber, nozzle, machining chamber, etc. have been discussed. After the proper fabrication and testing of each subparts, various types of process parameters and their effects on Material Removal Rate (MRR) were studied when performing the machining on Zirconia work piece. Two different types of abrasive particles were used and Stand-off distance (SOD) was also varied during the machining process. Then the readings obtained after the experimental were examined properly along with graphs.

Keywords: Abrasive Jet Machining (AJM), Material Removal Rate (MRR), Abrasive Particles, Stand-off Distance (SOD)

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Data analysis of the corrosion protection behavior of ginger, tea tree and grapefruit essential oil extracts on low carbon steel in H_2SO_4 solution

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Abstract : Data on corrosion inhibition of ginger (GG), tea tree (TR) and grapefruit (GF) oil extracts on low carbon steel in 0.5M H_2SO_4 are presented. The extracts performed effectively with optimal values of 99.56%, 98.17% and 98.32% at 2.5% GG, 3.5% TR and 3% GF concentrations. Corresponding corrosion rate values are 0.28 mm/y, 1.16 mm/y and 1.49 mm/y. Corrosion rate at 0% extract concentration is 63.33 mm/y. Performance of TR extract significantly varies with time and concentration with statistical value of 48.21% and 23.02%. GG and GF concentration where the only statistically relevant factors for GG and GF performance with statistical values of 68.42% and 73.20%. Standard deviation data for GG extracts varied minimally from mean values compared to TR and GF extracts. Results shows 92%, 18% and 63% of GG, TR and GF extracts inhibition data are above 95% inhibition value at margin of error of 6.99%, 10% and 12.19%.

Keywords: carbon steel; inhibitor; corrosion; plant extract; acid

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Effect of Thick Film Coating on Scratch Resistance of Aluminium 6082-T6 Alloy Under Varied Loading Conditions

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Abstract : Surface engineering and surface characteristics have significant effect on serviceability of engineering components. Coatings are applied on the surface of the substrate to enrich the existing property of the coated material. Adhesion of coatings to substrate is primary concern to ensure desired properties of the coated material. Aluminium 6082-T6 has been coated with three different hard coatings by using atmospheric plasma spray process under the same operating conditions having NiCr as a base coating for all. Prior to coating all necessary preceding procedures have been followed. Scratch was performed on the prescribed coatings to know the effect of load on scratch adhesion. Constant load, ramp load and step load were applied in accordance with ASTM standard. As a result, coatings failure mode was different in all coated substrates. NiCrAlY coatings exhibit high scratch resistance and high fracture toughness under tested conditions.
Keywords : *Aluminium 6082-T6,Plasma spray coating, Scratch test, cohesive failure, SEM analysis*

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Christmas-Tree Shaped Compact Microstrip Textile Antenna for Telemetry, ISM and X-band Applications

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Abstract : This article presents the development of a Christmas-Tree shaped textile monopole antenna. The radiating element of the propounded textenna appears like a Christmas-tree-shaped element, and a detective ground structure supports the primary radiating element. The proposed miniature antenna had dimensions of 30x20 mm^2 with a thickness of 1mm. It is developed on polyester material with a dielectric value of 1.05, and the conductive layers are actualized using the adhesive copper conductive. To excite the antenna, a 50-ohm microstrip feed line is used, enabling it to operate treble frequencies of 4.5, 5.5-7, and 8 GHz in Telemetry, ISM, and X wireless application bands. These operating bands were accomplished by inducing the triangular projections on both sides of the main radiating triangular patch structure. A prototype is built on the polyester material, and its functionality was confirmed in an anechoic chamber. The measured results are a good deal with the software simulations. The developed antenna has good radiating efficiency and gain, which are the foremost requirements to access the performance of the proposed antenna in the operating ranges.

Keywords: Christmas-Tree; defected ground structure; polyester fabric; Telemetry; ISM; X-bands.

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A simple fabrication of Mn doped SnO_2 nanoparticles towards improved congo red degradation photocatalytic activity

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ABSTRACT: Transition metal doped semiconductor metal oxide nanostructured materials has drawn serious attention due to their remarkable photo catalytic activity. In this work, we used a simple chemical tactic to synthesize undoped as well as Mn-doped SnO_2 nanoparticles. Powder X-ray diffraction data provide evidence of both pristine and Mn-doped SnO_2 nanoparticles are translucent with a tetragonal crystalline structure arrangement (P42/mnm space collective) that is outlined plainly worded even during synthetic precipitation approach. TEM is employed to evaluate the surface morphology dimensions of the nanomaterial's (TEM). UV–Vis DRS signify that optoelectronic transfer is reductions with the uptick of Mn concentration levels (0, 2, 6 % wt) and the red shift was noticed. The structural properties of a material are ascertained using the Fourier transform infrared spectroscopy technique. Photoluminescence (PL) is a instrument for determining depletion layer, tin interlayer deficiencies, and structural damage. The degradation of Congo red in an aqueous solution when there is UV light irradiation was used to evaluate the photo catalytic performance of the as synthesized nanoparticles. The photo catalytic efficiency of Mn (6 wt %) doped with SnO_2 has a substantially greater Mn content than the standard SnO_2. The method of enhanced photo catalytic activity of Mn-doped SnO_2 discussed in detail.

Keywords: *Tin Oxide; Mn doped SnO_2; Congo red; Nanoparticles*

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Process Parameter Optimisation of Fused Deposition Method for Augmenting the Strength of Nylon-Aramid PMC's

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Abstract : In mechanical parts and components, the strength of the material plays a vital role for its effective functioning. For certain individual materials, the enhancement on its quality of strength must be performed at the initial development stage and can rarely be performed using post processing techniques. 3-D printed Polymer Matrix Composites (PMC's) are one such material. The current research focuses on augmenting the strength of nylon-aramid PMC's, using Fused Deposition Method (FDM) 3-D printing technique. The 3-D printed material was tested according to ASTM standards for mechanical properties such as tensile, compression, impact, and flexural strength. Since the relationship between the mechanical properties and the processing parameters of FDM is challenging to verify, an effort was attempted to obtain an empirical formula using the Taguchi Technique of Optimisation. The influencing processing parameters of the FDM technique, such as layer thickness, infill part, print temperature, raster angle, density, and infill pattern style were optimised using the analysis of Taguchi combined with Multi-Response Performance Index (MPI),to enhance the Tensile, Flexural, Impact and Compression Strength, thereby augmenting the overall strength of the FDM component. These optimized levels obtained were reutilized in the processing of the of development of the FDM component. The mechanical properties were validated according to the ASTM standards of testing. The optimisation technique using T-DoE showed that the measured and the regression equation computed values were highly similar with minimalistic deviations. The research concluded that for a print temperature of 300°C, layer thickness of 0.4 mm, raster angle of 90°, infill part density of 90%, and having a rectilinear style of infill pattern, provided an optimal levels of process parameters for augmenting the strength of 3-D printed Nylon-Aramid PMC's.

Keywords:*3-D printing; Fused Deposition Method (FDM);Nylon-Aramid; Polymer Matrix Composites (PMC); Taguchi Design of Experiments (T-DoE); Multi-Response Performance Index(MPI).*

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Electrochemical data on the corrosion inhibition performance of admixed *Citrus paradisi* and *Zingiberofficinale* oil extractsin 0.5 M H_2SO_4 solution

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Abstract : Data output on the protection performance of the combined admixture of *Citrus paradisi* and *Zingiberofficinale*oil extracts (CPZO) on the corrosion inhibition of mild steel in 0.5 M H_2SO_4 solution are presented and described. CPZO effectively suppressed the electrochemical reactions on the steel surface with final inhibition values ranging between 95.16 mm/y at 1% CPZO and 96.61% at 3.5% CPZO concentration. CPZO reduced the corrosion rate of the steel from the value of 184.48% at 0% CPZO concentration to values between 3.45 mm/y and 8.94 mm/y in the presence of CPZO extract. CPZO performance remained marginally steady with respect to its concentration. However, variation with time was significant till 240 h. Effective inhibition performance was attained at 48 h of exposure. Calculated data from ANOVA analysis shows exposure was the only statistically relevant parameter at 98.63% compared to 0.75% for CPZO concentration. Adsorption of CPZO molecules on the steel aligns with the Langmuir and Frumkin isotherm models with correlation coefficient values of 0.9997 and 0.7292. Thermodynamic calculations depict chemisorption adsorption mechanism with ΔG values ranging between -46.13 and -43.23 KJ/mol. Optical images of the inhibited and non-inhibited steel significantly contrast each other.

Keywords: carbon steel; inhibitor; corrosion; plant extract; acid

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Geopolymer Concrete and its strength influencing variables

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Abstract : CO_2 emissions from the usage of Ordinary Portland Cement (OPC) polluted the environment. Because of this, OPC has been phased out of concrete in favour of an alternate material. In the coal industry, the fly ash is a waste product that is commonly accessible. Furthermore, fly ash is a more ecologically friendly and cost-effective alternative than OPC. Fly ash can be combined with alkaline solution to produce aluminosilicate gel in order to produce geopolymer concrete. To reduce porosity, fly ash fineness must be increased, which enhances compressive strength. A fly ash-based polymer, on the other hand, exhibited much superior resilience to abrasion, high temperature, and chemical attack than regular concrete. Concluding, the performance of fly ash-based geopolymer concrete can be altered by its design precursors to enhance the properties of geopolymer concrete.

Keywords: *geopolymer concrete, alkaline activators, mechanical strength, durability, sustainability.*

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Characteristics of Brillouin gain coefficient in magnetized piezoelectric semiconductor quantum plasmas

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Abstract : We have investigated the Brillouin gain coefficient in piezoelectric semiconductor plasmas taking into account the combined effect of with and without quantum as well as magnetic field effect. We have derived Brillouin susceptibility due to induced current density from QHD equations and Poisson's equation and obtained the relation for the Brillouin gain coefficient of the Stoke's component. We have analysed the degeneracy parameter and Wigner Seitz radius as a function of the electron career density n_0 in semiconductor plasmas for the finite temperature Fermi Dirac statistical theory within the valid range of non relativistic plasma density. The Brillouin gain coefficient studied for with and without quantum effect at $B = 0T$ and $B = 5T$ with the variation of wave vector and the electron career density n_0. The results show slightly changes with magnetic field.

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Analysis of Stress Intensity Factor of a finite plate with Centre Crack containing different hole shapes

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Abstract : The defects are usually formed in the components during the manufacturing process like for example, voids, micro cracks or presence of secondary phase particles. These defects act as stress raisers and increase the severity of stress situation in the component. The structural integrity assessment of such components containing cracks are usually evaluated using fracture mechanics. In components containing flaws, subjected to linear elastic loads, the magnitude of the crack driving force or stress intensity factor (SIF), determines whether fracture occurs or not. In this work, the effect of holes which are introduced in the vicinity of centre crack in a finite plate subjected to tensile load is investigated. This is accomplished through numerical simulation, where a two-dimensional model of finite plate with centre crack was created and validated against the analytical results. The holes are then introduced in a systematic manner to analyse its effect on the mode I SIF.

Keywords: Fracture mechanics; Tensile loading; Stress intensity factor; Fracture parameter; Centre crack;

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Parametric studies of Degradation of reactive red 120 by a novel approach of hydrodynamic cavitation

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Abstract : Hydrodynamic cavitation (HC) was used to study the degradation of reactive red 120 (RR120). The effect of several parameters such as RR120 concentration in liquid, operating pressure, system temperature, pH, and the effect of an oxidising agent (H_2O_2) on RR120 % decolorization has been examined. Decolorization of RR120 via hydrodynamic cavitation appears to follow first-order kinetics. Using HC at 3.5 kg/cm^2, 30^{o}C, pH=2 and 10 mg l^{-1} dye concentration in aqueous solution, 74 percent decolorization was achieved.

Keywords: Hydrodynamic Cavitation; RR120;Degradation.

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Experimental Study on Mechanical Properties of Al5083/ZrO_2/B_4C Hybrid Aluminium Metal Matrix Composites

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Abstract : In this paper aluminium metal matrix composite samples are prepared by reinforcing B_4C and ZrO_2 in Al5083 using stir casting furnace. In this work, two types of AMMCs are prepared. In first type composite, different weight percentages (wt%) of the nano reinforcement (ZrO_2) are added from 0.6 to 1.8 in aluminium matrix. In the second composite, two nano reinforcements ZrO_2 and B4C are combinedly added in the wt. % from 0.6 to 1.8 in AMMCs. The prepared composite samples are tested for their tensile strength, hardness, impact strength and wear rate. A good improvement in these properties is observed with the hybrid reinforcement. The hybrid composites show better values compared to ZrO_2 composites for same weight percentages and thereby weight could be reduced. Further, micro structural studies are conducted on fabricated Composites, from this it is revealed that there are uniform distributions of reinforcements in the matrix material. This material is more useful for aerospace application where high strength to weight ratio is required.

Keywords: Hybrid composites; Stir casting;Wear rate; Reinforcements; Base material.

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Design and Experimental Analysis of Dynamic Vibration Absorber (DVA) to Reduce Vibration in Rails by Using EPDM Material

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Abstract : From few decades, the fracture of rail has found a peculiar issue in railways and the reason is due to the high dynamic frequency propagation in rail joints. Reducing the dynamic vibrations in rails is one of the solutions to overcome the mentioned problem. This article try to study the influence of design parameters on dynamic response of the railway track structure by implementing Finite Element Method (FEM). Two types of rail absorbers have been considered and compared i.e EPDM and DVA It is found that , EPDM with different layers at rail joints exhibits more efficiently in reducing vibrations and also have very good damping coefficient, excellent abrasion resistance and good tear resistance when compared DVA.

Keywords: Railway track, Rail absorber, Finite element method, Vibrations, Ethylene Propylene Diene Monomer (EPDM), Dynamic Vibration Absorber (DVA).

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Topical Delivery of Natural Extract for Accelerated Wound Healing

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Abstract The present research work aimed at developing a topical dosage form from onion extract for accelerated wound healing action. Onion extract was subjected to phytochemical screening, GC-MS analysis, *in-silico* studies against selected proteins involved in wound healing process. It was assessed further for*in-vitro* cytotoxicity and *in-vitro* scratch assay on mouse fibroblasts cell line. Topical film forming onion extract spray formulations were prepared using Eudragit RS-100 as the film forming polymer using mixture of both stinging and non-stinging solvents. Gels were prepared using Carbopol as gellinf agent. Topical gels and film forming sprays were prepared and compared for wound healing. Gel formulations prepared with Carbopol-940 and HPMC showed better physico-chemical properties. The developed formulations were characterized for pH, viscosity, swelling index, spreadability, drug content, density, spray pattern, spray angle, drying time, average weight per dose, drug content and *in-vitro* permeation studies. The *in-vitro* cytotoxicity assay revealed cytocompatibility of the onion extract with L929 cell lines and possessed significant wound healing potential at concentration of 0.062%v/v when subjected to in vitro scratch wound healing assay.

Keywords – *Onion Extract, Spray, Topical gel, Scratch assay*

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Design Optimisation of Heat Sinks to Enhance its Thermal Conductivity Tested Through Computations Simulations

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Abstract : A Pin-Fin is a component of heat sink, of a thermal system that aids in the dissipation of heat produced. The efficiency of the system is determined in large part by the design of the pin fin. The goal of the study was to use the Taguchi method of optimization to construct a Pin-fin with certain geometry and analyse it using computational simulations. To study the numerous tests to be undertaken on the performance characteristics, an orthogonal array was used. Base Plate Thickness, Fin Height, Fin Width, and Fin Spacing were all considered when designing the heat sink's pin-fin. As a result, the L-9 orthogonal array was chosen, and testing was carried out using commercial simulation software. The simulation testing took place in a Steady-State environment. For efficiency, heat flux, and temperature difference V/s heat sink characteristics, the Signal to Noise ratio was shown. Various iterative trials were compared using the produced graphs and the temperature dissimilarity that exists between the base and the fin tip to determine the most optimum design. In comparison to the other models with inconsistent response characteristics, the study found that heat sink models with a mid-range of thermal efficiency proved to be of reliable design.

Keywords: *Heat Sinks; Aluminium; Optimisation; Taguchi Method; Steady State Analysis; Thermal Simulations.*

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Green Synthesis of Graphene Oxide Extracted from Punica Granatum and Applications

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Abstract : In this present work, the green reducing agent is used for the synthesis of reduced graphene oxide (rGO) from the Punica granatum (pomegranate) extract. The suitability of pomegranate juice was used as a capping agent and also a reductant to form the Graphene oxide (GO). Hummer's method is used to oxidize the graphite for the synthesis of graphene oxide was applied. The graphene oxide has been prepared by oxidation of graphite with H_2SO_4. The physical and chemical properties of the GO and rGO were observed using UV-Vis spectrophotometry. Finally, rGO synthesized from the extract was contemplating as good adsorption for removing the methylene blue (MB). The adsorption behavior of this new adsorbent is suitable well with pseudo-second-order kinetics and Langmuir isotherm models. Synthesized rGO samples exhibited excellent activity as an adsorbent for the removal of dye. X-ray powder diffraction (XRD), Fourier Transform Infrared spectroscopy (FTIR) confirmed the formation of graphene. The study of the morphological structures was carried out by Field emission scanning electron microscopy (FESEM) used to characterize the sample. The proposed method is eco-friendly, low-cost, and capable of the largescale production of rGO.

Keywords: Graphite oxide, Reduced Graphene Oxide, Punica Granatum Extract, Adsorption, and Dye

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Hydro-biological assessment of sustainable Desert Rain-Fed Ponds of Western Rajasthan Using Physico-chemical Characteristics and Phyto-planktonic Indices

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Abstract : The present study investigates and reports the water quality of small rain-fed water reservoirs of Nagaur district, Rajasthan, India. These surface water bodies are called Talab and Nadis in the local language and play a significant role in fulfilling rural domestic water demands throughout the year. The microfloral investigations of these ponds were neglected in the past. So, there is a need to investigate water quality checks to improve the use of storage water strategy. The water samples were collected monthly from selected four sampling ponds located in and around Nagaur city in nearby villages for Physico-chemical and phyto-planktonic analysis. Physico-chemical parameters such as pH, TDS, Fluoride, Nitrate, Total Hardness, and Total Alkalinity were determined by following the standard method of A.P.H.A., and results were compared with the Indian Standard of drinking water by the Bureau of Indian Standard, IS:10500;(B.I.S. 2012). Palmer Pollution Index for genera was also employed by using algal and phytoplankton identification. It was concluded from the results that among all sampling sites one of the urban sampling talab(Jada Talab) located in Nagaur city showed deteriorated water quality but in all village ponds good water quality was recorded in rainy and winter but in summer's phytoplankton analysis indicated poor water quality. The present study will be helpful in the future framework for the improved understanding of hydro-biological research and improvement in sustainable water management strategies in old water conservation rain-fed ponds of Western Rajasthan.

Keywords: water quality, Palmer Pollution Index, Physico-chemical, Phyto-planktonicanalysis, Nadis.

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The Influence of Metakaolin, Silica Fume, Glass Fiber, and Polypropylene Fiber on the Strength Characteristics of High Performance Concrete.

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Abstract : Products that are pozzolanic Metakaolin (MK) & Silica fume (SF), both smaller than cement, are being used in the making of concrete and have been shown to improve the characteristics of the concrete. This study uses the combination of MK and SF as a supplementary cementitious material. It was planned to explore the mechanical characteristics of Binary Fiber and Admixture based High-Performance Concrete (BFAHPC), which uses glass fibres (GF) and polypropylene fibres (PPF) as an inclusion. The water binder proportions (W/B) of 0.275, 0.300, 0.325, and 0.350, respectively, were used, together with an aggregates to binder content (A/B) of 1.75. MK and SF were substituted in proportions ranging from 0% to 15%, GF was introduced in volume percentages ranging from 0% to 1%, and PPF was held constant at 0.25 percent. The overall effect of MK with SF at 5% each as cement replacements, together with fibre dosages of GF=1% and PPF=0.25% for W/B of 0.275, was shown to be the perfect pairing for obtaining maximal strength qualities for BFAHPC. The results obtained from this work also yielded a relationship in terms of mathematical equations relating cube compressive strength with split tensile, and flexural strengths of metakaolin and silica fume-based BFAHPC.

Keywords: Binary fibers&admixtures, Glass fiber, Metakaolin, Mechanical properties, Polypropylene fiber, Silica fume.

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DPVM-SEC based Methodology to Reconfigure PV System and Characterization during PSCs: Experimental study using Data Acquisition System

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Abstract : Partial shadowing produces significant hindrance to the efficient use of solar photovoltaic (PV) system. Partial shading conditions (PSCs) reduce PV system performance and show the highly non-linear behaviour with respect to power-voltage (P-V) graphs. A technique is suggested in the manuscript to reduce the impacts of shadowing on PV arrays, through a novel algorithm to make a 6×4 size array. Also, the efficiency of the traditional arrangements, series-parallel (SP) and total-cross-tied (TCT) are analyzed and compared with the dynamic PV module and static electrical connections (DPVM-SEC). Various performance indices such as, power and voltage at global maximum power point (GMPP), power loss (PL)and fill factor (FF)are evaluated to demonstrate that the DPVM-SEC based method is the appropriate configuration for eliminating the shading impacts. Furthermore, an ATmega-328 microcontroller based data acquisition system (DAS) is developed to measure the real-time electrical parameters. The experimental study demonstrates the feasibility to characterize the PV system with accuracy and less time taken processes. In this paper, the design of DAS is very useful for new learners and affirms the feasibility to use in further related PV system characterization study under static and dynamic environmental conditions.

Keywords: Renewable energy, sun irradiation, power loss, fill factor, shade dispersion

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Frequency Regulation Analysis for Renewable Bio Generated Autonomous Multi-Microgrid Using Moth Flame Optimized Fractional Order Controller

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Abstract : Microgrid (MG) is considered as an active cell for grid control and management in the modern power system environment. The load frequency control of multi-micro-grid (MMG) consisting of two micro-grid connected through a tie-line is discussed in these paper. In order to achieve this, a mathematical model is proposed based on renewable energy resources with multi-load perturbations. The proposed microgrid-1 consists of Hydro, variable load, Solar Photo Voltaic (SPV), Bio Gas Turbine Generator (BGTG), Battery Energy Storage System (BESS) and while, the proposed microgrid-2 consist of Battery Energy Storage System (BESS), Solar Photo Voltaic (SPV), Hydro, Biodiesel Engine Generator (BDEG) and variable Load. During a disturbance in the system frequency the instant load sources is tackle by BESS, BDEG and BGTB. Fractional-Proportional-Integral-Derivative (FPID), Proportional-Integral-Derivative (PID) and Proportional-Integral (PI) where use to controls the load frequency of the proposed MMG systems. The variable values (gain) of the controllers where considered as a control variable and integral square error (ISE) considered as being a fitness function of the optimization algorithm. The performance in relations of the dynamic response of the controllers are deliberate using different optimization techniques namely, Firefly algorithm (FA), Ant Lion Optimization and Moth Flame Optimization (MFO).

Keywords: Multi-microgrid, fractional-Proportional-Integral-Derivative, Solar-Photo Voltaic, Moth Flame Optimization, Bio Gas Turbine Generator, Biodiesel Engine Generator, Battery Energy Storage System.

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Formulation and In-vitro Evaluation of Grape Seed Extract Containing Dentifrice

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Abstract : A new group of phytochemicals that has been attracting much attention from both the general public and health professionals is a novel drug proanthocyanidin. Grape seed extracts (GSE) are one of the richest sources of proanthocyanidin. GSE increases the expression of anti-inflammatory cytokines and decreased the expression of pro-inflammatory cytokines, thereby reducing the progression of inflammatory diseases such as periodontitis. The aim of the present study was to formulate and evaluate the ability of GSE containing dentifrice to exhibit biologic properties favouring superior oral health status. The test sample consisting of toothpaste containing GSE was formulated and subjected to laboratory investigations. The loaded discs were placed in the Muller-Hinton medium and incubated at 37°C for 24 hours to evaluate its anti-bacterial efficacy against periodontal pathogens. The cytotoxicity study on live cell lines and cell viability was estimated after incubation for 24 hrs at 37°C in a 5% CO_2 atmosphere. IL-6 and TNF-α expression by inflammatory cells were tested against Raw cells. The radical scavenging activity was calculated by incubating the test tubes containing the samples in DPPH (2, 2-diphenyl-1-picrylhydrazyl) solution.Comparative analysis of the test sample and control showed significant anti-bacterial (zone of inhibition comparable to positive control), anti-inflammatory (reduced IL-6 and TNF-α expression) and anti-oxidant efficacy (DPPH RSA inhibition on dose dependent manner with IC50 value of 472.75ug/ml). The current in-vitro study provides evidence supporting the efficacy of grape seed extract containing dentifrice in being a potential oral hygiene aid to be used in inflammatory states such as periodontitis.

Keywords: Toothpaste; Grape seed extract; periodontitis; oral health; herbal; red complex bacteria

1090

ZnOcodoped with Si and Mn–Preparation, characterization and photocatalytic reduction of hazardouschromium (VI) by the codoped ZnO

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Abstract : Zinc oxide-silicon dioxide nanocomposite, doped with manganese, was blended by chemical co-precipitation mode. Its structural properties, surface morphology, and optical properties had been probed by x-ray diffractometer, field emission scanning electron microscope then ultra violet-visible spectrophotometer. The dependence of properties on manganese concentrations was investigated. It was observed that the structural properties, band gap and photocatalytic properties are influenced by the amount of manganese ions. Hexavalent chromium is hemotoxic, genotoxic as well as potent carcinogenic. The doped nanocomposite was tested for photocatalytic conversion of hazardous chromium (VI) to chromium (III) under ultra violet besides sunlight. Best result for chromium reduction was achieved in 60 minutes with 10 % manganese doped nanocomposite under sunlight. The prepared nanocomposite is more active under sunlight than under ultra violet.

Keywords: *Nanocomposite, photocatalytic reduction, zinc oxide, sunlight, ultra violet*

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Analysis of Mechanical Properties Based on the Nodularity in the Spheroidal Graphite Iron.

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Abstract : Spheroidal graphite iron is used in the manufacture of cylinder liners. It gets its name from the shape of nodules, which is the form of carbon found in them. Carbon content in cast iron ranges from 2.1 percent to 6.67 percent. The needed carbon percentage for spheroidal graphite iron is approximately 3% to 4.3 percent C and 1% to 3% Si. To obtain the spheroids, around 0.04 percent Magnesium is added to the liquid alloy, which aids in the elimination of Sulphur and oxygen and causes the spheroids to expand. Magnesium is introduced to the cast molten metal at around 1500°C and vaporizes around 1150°C.As a result, to notice increased nodularity, the cast must be created within the temperature loss. To efficiently utilize the magnesium, this has been examined with a three-time length of manufacture of the cast product. Because there are fewer nodules in centrifugal cast specimens, the production of spheroids decreases, which has a significant impact on the mechanical qualities of the product. This research looks at the effect of mechanical properties on the nodules found in cylinder liners.

Key words: Centrifugal casting, Spheroidal graphite iron, nodularity, mechanical properties

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Design optimization of Spoke IPM motor for improving efficiency using PSO and Rao-1 algorithm based FEA

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Abstract : The rate of demand for permanent magnet synchronous motor (PMSM) in all types of applications is elevated day by day. Many topologies of PMSM have been developed and utilized in different sectors. Much software's are available for primary analysis of motor which have an inbuilt Finite Element Solver. The study presented in the paper aims to optimize a spoke shape interior permanent magnet synchronous motor (IPMSM) design parameters using particle swarm optimization technique (PSO), Rao-1 algorithm. Here a 4 pole 24 slots spoke shape IPMSM motor is considered to optimize its parameters such as outer, inner stator diameter, rotorouter diameter, height of magnet, stator tooth width and base width of slot. Result obtained and effectiveness of optimization are validated by comparing with the results reported in literature. Efficiency, torque, magnetic field, and other electromagnetic parameters are calculated and reported for the optimized IPMSM parameters. For improving the efficiency of IPMSM, an analysis of its different design factors is focused. In this study efficiency improvement is achieved by optimizing stator slot featuring, and rotor parts designing. The corresponding results are reported. The complete operational analysis has been conducted in ANSYS Maxwell and MATLAB environment. Here total excitation of the motor highly depends on the magnetic material used in the rotor part of the motor.

Keywords: Electromagnetic Parameters, Finite Element Analysis, Interior permanent magnet synchronous motor (IPMSM), PSO, Rao-1 algorithm

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Potential Efficacy of a Fruit Waste - Manila Tamarind Seed Powder for the Adsorption of Hazardous Dyes from Aqueous Solution: Batch Studies

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Abstract : The adsorption performance of the material Manila tamarind seed powder, a fruit waste for removal of methylene blue- MB, eosin yellow-EY, crystal violet-CV, malachite green-MGdyes were checked through batch experiments. Parameters such as agitation time, biosorbent size, dosage, pH, initial concentration and temperature were studied for the removal of the dye. The functional groups present in Manila Tamarind Seed Powder were identified using FTIR analysis both before and after treatment. Sorption equilibrium reached rapidly with 83.76% MB in 120 min; 75.00% CV in 100 min; 89.65% MG and 93.40% EY in 60 min respectively. Out of the four dyes EY was removed more effectively by manila tamarind seed powder. The adsorption data is analyzed by Freundlich, Langmuir isotherms. Freundlich and Langmuir models were found to be most applicable. The adsorption process agreed to the pseudo second order model with correlation coefficient $\geq$ 0.999. Manila tamarind seed powder was reported to be beneficial in the study as a highly effective sorbent for removing EY from aqueous solutions.

Keywords: *Adsorption, Manila Tamarind seed, Dyes, FTIR, Adsorption Kinetics and Equilibrium Isotherm.*

2003

Effect of Laser Cutting on Mechanical Performance of Woven Glass Fiber Reinforced Plastic Composites

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Abstract The present study is an attempt to investigate the effect of laser cutting on the mechanical performance of woven glass fiber reinforced plastic (GFRP) composites. The composite material is fabricated by combining woven glass fiber cloth and epoxy resin with hardener. Then the GFRP composites are both mechanically cut and laser cut to prepare samples for mechanical performance testing. Prepared samples are tested as per respective ASTM standards to find tensile, flexural and hardness behaviors. Scanning Electron Microscope (SEM) micrographs of the machined surface and tensile fractured surface are analyzed concerning surface integrity and fracture characteristics. Finally, the results of the above tests are compared to find out whether mechanical cutting or laser cutting leads to superior mechanical performance of GFRP. Mechanical performance tests indicate that tensile and flexural properties are superior in mechanically cut samples compared to laser cut samples while micro hardness properties remain similar. SEM micrographs show compromised surface integrity due to thermal damage in the case of laser cut samples which is attributed to the loss of tensile and flexural properties while fracture characteristics remain similar.

Keywords: GFRP composites; Laser cutting; Mechanical cutting; Mechanical performance; SEM observation

2004

Low temperature synthesis of MoO_3 nanoparticles by hydrothermal method: Investigation on their structural and optical properties.

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Abstract : Molybdenum trioxide nanoparticles have recently achieved notable attention in optoelectronic and biomedical applications due to their excellent structural, chemical, electrical, catalytic, and optical properties. The work presented here demonstrates the synthesis of orthorhombic MoO_3 through the facile hydrothermal method at low temperature. Structural and optical properties of the synthesized sample was examined. The structural analysis was performed through X-ray diffraction studies and Raman spectroscopy. The XRD peaks were concordant with the standard reported MoO_3 peaks which corresponds to the orthorhombic structure of MoO_3. Micro-strain effects were also verified by Williamson-Hall method using uniform deformation model, uniform stress deformation model, and uniform deformation energy density model. Raman spectroscopic data also reconfirmed the orthorhombic structure of the sample. A wide bandgap value of 4.9 eV was estimated from optical analysis using Tauc plot. In photoluminescence spectroscopy, peaks are related to the transition between the sub-bands of Mo^{5+} defects. Being a wide bandgap oxide semiconductor, MoO_3 is a promising material for luminescence applications.

Keywords: Micro-strain effects, Williamson-Hall plot, Wide bandgap, Orthorhombic, Luminescence

2005

Analysis of Smart Biomaterial containing Umbilical Cord Blood Serum Protein Conjugated with P-(NIPAAM) using Spectroscopy

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Abstract: HUCBS (Human Umbilical Cord Blood Serum) is a complex and evolving collection of proteins that promotes fetal development. In the realm of regenerative medicine, the important proteins found in HUCBS are of great interest. The smart biomaterial generated from human umbilical cord blood serum is described in this paper. To characterize this novel biomaterial, human umbilical cord blood is obtained from healthy mothers in sterile vacutainers and allowed to clot for 24 hours under room temperature then the supernatant serum was collected, centrifuged and lyophilized. Later, this material was converted to smart biomaterial by homogenizing with polymer followed by lyophilization. This sample was subjected to physico-chemical characterization usingAttenuated Total Reflectance-Fourier-Transform Infrared (ATR-FTIR) Spectroscopy and Nuclear Magnetic Resonance (NMR). The quantification of the protein -polymer conjugate helps in understanding the possible clinical effectiveness of the smart biomaterial in drug delivery.FTIR and NMR investigations were used to determine the structural stability of protein molecules found in smart drugs.

Keywords: Umbilical cord blood serum, Smart Polymer, NMR, FTIR

2007

^{1}H NMR based study of Cord Blood Platelet Rich Plasma Conjugated with N isopropyl acrylamide-gold nano particles

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Abstract : AuNPs have a vast scope and can be widely used in imaging, therapeutic, and diagnostic systems. The complex synthetic chemistry of gold nanoparticles enables for precise control of both physicochemical and optical features. In addition to being nontoxic, gold cores are also inert and biocompatible. To understandthe adsorption of proteins in the cord blood PRP(CB-PRP) with PNIPAM-AuNPs, NMR spectroscopy was used to characterize the complex system. As a result, NMR analyses revealed the structural stability of AuNPs coupled with CB-PRP and polymer. The findings specified that protein – PNIPAM-AuNPs conjugate can influence protein activity and to a large extend resist degradation of protein, increasing the target delivery of desirable protein at cellular level.

Keywords: gold nanoparticles; PRP; N isopropyl acrylamide;

2009

Thermal radiation of viscoelastic-based Micropolar nanofluid with MHD effects on boundary layer

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Abstract : This work concentrates on 2-Dsteady incompressible flow of a micropolar nanofluid past a linear stretching sheet with a viscoelastic and magnetic field. The flow of nanofluid is treated with slip condition and thermal radiation. A system of equations of nanofluid has been analyzed by a combination of the similarity transformation and BVP4C method. The numerical results are individually analyzed for all dimensionless numbers. Velocities, temperature, concentration, skin friction, Nusselt number and Sherwood are discussed graphically with the use of Matlab. The velocity profile reaches peak with the rise in micropolar and material parameters, while other parameters are reducing. The temperature profile heightens with escalating Eckert number, magnetic and radiation parameters. The concentration profile shoots up with increasing magnetic and thermophoresis parameter, while decreasing Brownian motion and Schmidt number. Micropolar, skin fraction, Sherwood and Nusselt numbers are calculated through tables finally.

Keyword*: Micropolar nanofluid, Heat and mass transfer, viscoelastic, MHD, Stretching sheet*

2010

Modeling green Organic field effect transistors from common biodegradable materials

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Abstract : A device fully growing green provides great advantages in terms of increased flexibility, rise in number of charge carriers and biocompatibility. Organic field effect transistors (OFETs) offer high potential applications in bio medical and allied fields and developing suitable models for analysis of the OFETs are essential for their large-scale production. Here an attempt has been made to model some green OFETs using extracted data from experimental reports. Modeling and simulation of three different p type semiconductor-based low voltage OFETs are undertaken. The modeled devices used Albumen[1] and silk[2] as dielectric materials in two of them. One of the devices is made with HD 230 paper[3] as the substrate. It has been found that the compact model provided nice fitting with the experimental characteristics when used with genetic algorithm for parameter extraction[4].

Keywords: Organic field effect transistors; genetic algorithm; threshold voltage; mobility; subthreshold swing

2011

Radial Basis Function Bipolar Fuzzy Neural Network

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Abstract : This paper deals with radial basis function neural network on bipolar fuzzy sets. Bipolar Gaussian positive and negative membership function acts as activation function in this network. An algorithm is developed based on Radial basis function bipolar fuzzy neural network. Further, an example is given based on the technique of injection molding process using thermoplastic raw materials, to select the highly durable plastic material product.

Keywords: Bipolar fuzzy set; radial basis function bipolar fuzzy neural network; Gaussian positive and negative membership functions; Entropy.

2012

Performance Optimization of Electrically Variable Double Gate Junctionless Transistor with HfO_2 Gate Dielectric

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Abstract : A non-traditional novel structure of electrically variable double gate nano-scale junction less transistor is proposed. Simulation study of the proposed structure is performed to understand its performance. Variation of the gate voltages are done to demonstrate the effect of variable gate in the performance of the device. Analysis of the structure shows that improvement in transconductance can be achieved in subthreshold region with the variation in side gate voltages. Independent change in side-gate voltage near the drain and source also shows satisfactory results. Improvement in transconductance, threshold voltage will be suitable for the use of the structure in subthreshold region for circuit application.

Keywords: Junctionless transistor, tranconductance, electrically variable gate, double gate, threshold voltage, HfO_2;

2013

The Effect of Alkali Treatment on Physical and Thermal Properties of Aak Fiber

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Abstract Natural fibers is used now as an alternative for artificial fibers in fiber-reinforced composites have expanded and opened up new industrial opportunities, according to research. Low density, low cost, and biodegradability these all are advantages of natural fibers. However, because of natural fibers there are some shortcomings developed in composites that are poor fiber-matrix compatibility and significant moisture absorption. Chemical treatments are being studied for changing fiber surface properties to overcome these limitations.

Aak fiber is a lingo-cellulosic raw material that can be used to make low-cost, environmentally friendly composite products. Aak Plant can grow easily in desert area and it require very less amount of water. In this study, Aak fiber (Calotropis Procera) is employed to strengthen a phenol-formaldehyde matrix. Alkali treatment alters the surface of the fiber for better properties. This treatment is aimed to improve adhesion between fiber surfaces while also increasing fiber strength. FTIR spectroscopy and SEM were used to examine the changed surface of fiber and its composites. A tensile test was used to assess the improvement in mechanical strength of fibers after alkali treatment. TGA test was also used to analysed the thermal stability of fiber after alkali treatment.

Keywords: Aak fibers; surface modification; FTIR spectroscopy; SEM; thermal analysis

2014

Effect of pH on the structural and optical properties of cobalt oxide nanoparticles synthesised by hydrothermal method

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Abstract : This paper reports the synthesis and characterisation of cobalt oxide nanoparticles synthesised under different alkaline pH of the precursor solution by hydrothermal method. Cubic spinel nature of Co_3O_4 crystallites were confirmed by the x-ray diffraction pattern (XRD) and Raman spectrum. The crystallite size decreases as the pH value increases. The absorption spectrum exhibited two broad bands which are in agreement with the cobalt oxide band structure. A change in bandgap was observed with pH of the precursor solution in agreement with size effects. Photoluminescence (PL) spectra consist of a broad emission with different peaks which are due to point defects.

2017

Study on Properties of Recycled Aggregate Concrete with Zeolite

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Abstract Sustainability can be attained only by not depending on the natural resources. We have been exploiting natural resources for obtaining raw materials by digging mines and disrupting the environment. We can overcome this by learning to recycle the materials which are disposed as waste. Recycled concrete aggregates are the construction and demolition waste which are dumped as landfills or very few times used as filler materials. The limited usage of these aggregates is because of its disadvantages like high water absorption and permeability, low compressive strength etc. These appalling properties are caused by the mortar of previous concrete matrix attached to it. This old mortar fails to create strong bond with new mortar forming weak inter transitional zone. In this study, the enhancement in the properties of recycled aggregates with zeolite as the partial cement replacement is studied. Zeolite has high silica content which forms extra C-S-H gel when it reacts with Ca(OH)2 which decreases the pores and makes concrete more durable. In this work, there are four trial mixes, 5% and 10% zeolite were added with 100% recycled aggregate concrete (RAC) and compared with conventional concrete. The compressive strength of recycled aggregate concrete is decreased by 10% when compared to conventional concrete but the strength is enhanced up to 3% with the addition of 5% zeolite. The split tensile strength is decreased by the addition of 5% zeolite with recycled aggregate concrete but that decrement is increased by 40% with 10% zeolite replacement. The flexural strength is increased by 26% and 13% with the replacement of 5% zeolite compared with normal concrete and recycled aggregate concrete. Sorptivity test and RCPT test was carried out to determine the durability of concrete. The water absorption capacity of RAC is reduced by 38% and the chloride ion permeability is increased by 5% with the replacement of 5% zeolite. In order to minimize the consumption of natural resources and to attain the desirable properties, zeolite can be adopted to increase compressive, flexural strength and durability.

Keywords: pores; sustainability; bond strength; durability ; recycling; attached mortar;

2018

Studies on Properties of Polymer Modified Aerated Concrete

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Abstract In today's world, Precast materials play a vital role in the total construction time of a structure. Some structures use customized materials to be used as precast members. Therefore, altering or optimizing lightweight concrete will help the industry reach new heights. Lightweight concrete is the concrete type that has a density lower than 1200 kg/m3. This lightweight concrete is achieved due to the distributed air voids which are caused by a few aerating agents such as Aluminium powder and Hydrogen peroxide. Pulverized M-Sand is used as the fine aggregate because of the size of the particles which will help to release the oxygen or hydrogen during the chemical reaction between the calcium in the cement and aerating agents. Usually, Aerated concrete types tend to have low strength due to the distributed air voids. Aluminium powder is used as the aerating agent which helps in liberating hydrogen gas when it reacts with the calcium of the cement. The main objective of this study is to optimize the aerated concrete to attain great strength thereby not compromising the density. Here, Styrene butadiene Rubber (SBR) Latex is used as the additional material which helps in better bonding of materials with more strength and reduced density. The conventional aerated concrete with variations of 0.3% and 0.5% Al powder achieved a compressive strength of about 9.81MPa and 7.65MPa respectively. With this mix proportion, 0.5% of SBR latex is added and there was a clear increase in strength of about 11.12MPa for 0.3% of Al powder and 9.18Mpa for 0.5%. Similarly, the bulk density of aerated concrete was also an acute increased. Adding the bonding agent (SBR) helps to increase the durability of the concrete. With this proportion in comparison with the commercial concrete, it would be a good increase in both mechanical and durability parameters. Hence, this study shows that SBR (latex) added, increases the strength parameters of the lightweight concrete which will help in precast structures.

Keywords: aeration; bonding; strength; durability ; voids; microstructure;

2019

Properties of High-Performance Concrete with Automobile Grinding Waste as Replacement of Fine Aggregate

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Abstract : The amount of waste generation in automobile industries during the manufacturing process is constantly increasing due to the increase in population. For each ton of steel usage, 0.1 tons of steel is discarded as waste. That is collectively known as Automotive Steel Sludge (Auto-SS). The concrete which has increased strength, high durability, and better mechanical properties is called High-Performance Concrete (HPC). The objective of this study is the utilization of waste steel sludge as a replacement for fine aggregate that can control environmental effects and scarcity of natural resource materials like river sand. The steel sludge is finer when compared to sand, It was a positive indication for producing High-Performance Concrete with Auto-SS. Replacement trials were carried out for river sand with Auto-SS. Compressive strength was taken with a comparison of conventional concrete and river sand replaced with Auto-SS concrete cubes. The compressive strength of normal concrete gives 61.80 N/mm2, but the replacement specimen gives 64.62 N/mm2 which is higher than conventional. Thus the results of the tests in these studies show that usage of steel sludge for the replacement of fine aggregate in high-performance concrete can be used in real-life execution in the construction of heavily loaded structures like high-rise buildings, bridges, flyovers, offshore structures, and tunnels is a better way.

Keywords: high-performance concrete; Automotive steel sludge;

2020

Study on Properties of Foam Concrete with foundry sand and Latex

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Abstract Foam concrete is lightweight concrete with relatively low density compared with normal conventional concrete. Metal casting and foundry industries produce a large amount of waste and are discharged into the environment thus causing pollution. Foundry sand is one of the waste products from the foundry industry which shows increased strength properties when mixed in concrete. Thus, in this research paper, we tried to study the properties of foam concrete by replacing the pulverized sand with foundry sand at 20%, 40%, and 60% and tried to enhance the strength of concrete by adding various chemical admixtures. To enhance the strength of foam concrete, Styrene-Butadiene Rubber latex (SBR) is incorporated into the mix which provides additional binding strength to concrete. The fineness of fine aggregate also plays a major role and if the fineness of sand is increased, it increases the strength of the concrete. Superplasticizers which are also known as high-range water reducers are also used. Gypsum is calcium sulphate in hydrated form and is used in restraining the rate of hardening of concrete. The silica fume which is known for its high early compressive strength, flexural and tensile strength is used. Thus, with the addition of these chemical admixtures, the foam concrete is cast and the specimens are subjected to various tests like sorptivity test, compressive strength test, and rapid chloride penetration test and the result are recorded. Since this concrete makes use of foundry sand, a waste material that is dumped in large quantities into the environment by foundry casting industries throughout the year. Hence the usage of this waste material in making foam concrete not only reduces its quantity in the environment but is also used to make environment-friendly and sustainable concrete.

Keywords: pulverized sand; binding; strength; hardening; compressive; flexural; tensile;

2021

Synthesis and Electrochemical Characterization of Electrospun Biocompatible Poly (Ɛ- caprolactone) and Polyaniline Nanofiber Composite Electrode Materials for Various Biosensing Applications

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Abstract : Electrospun nanofibrous scaffolds have attracted extensive attention in biosensor applications. Typical structures were made using low molecular weight (M_w ~ 10,000) Polycaprolactone (PCL) along with Polyaniline (Emeraldine salt) via the fiber production technique of electrospinning. The functional group's identification, structural and morphological analyses and electrochemical studies of the nanocomposites were performed. The Cyclic voltammetric and Impedance spectroscopic studies along with a newly designed equivalent circuit, indicate the sensitive and fast responses of the PCL/PANI nanocomposite material, with unique porous structures developed within the material, provide a potential opportunity to develop into a sensitive sensor electrode material.

Keywords: Electrospinning; Biocompatible; Low molecular weight Polycaprolactone (PCL); Polyaniline (PANI); cyclic voltammetry, Biosensor

2024

The micromagnetic study of stabilizing parameters for the interfacial skyrmions

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Abstract : Skyrmions are localized topologically protected spin arrangements that can be mapped to a unit sphere. Various energies factors such as exchange energy, Dzyaloshinskii-Moriya (DM) interaction, uniaxial magneto crystal line anisotropy, and Zeeman energy play an significant role in the stabilization of the skyrmions. Using micromagnetics as a tool, here we simulate these fundamental parameters that require for the stabilizing magnetic skyrmions. Our work comprehensively predict that how magnetic texture will modification can be expected with varaible values of the exchange constant, uniaxial magneto crystalline anisotropy constant, DM constant, and saturation magnetization. Our results indicate that higher saturation magnetization dissolves the skyrmions. Among all these factor, DM interaction play a crucial roleas higher the value of the DM constant helps in the evolution and creation of skyrmions. An optimum value of exchange energy is favorable for skyrmion stability. Similarly, a higher anisotropy constant further reduces the skyrmions size.

Keywords: Skyrmions; Micromagnetics; Dzyaloshinskii-Moriya Interaction; Magneto-crystalline anisotropy; Exchange interaction; Magnetization.

2025

Studies on structural and magnetic properties of Nanoporous Li^+ substituted $MgFe_2O_4$ nanomaterials for its application in hydroelectric cell with other areas of Science & Technology

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Abstract: The present research work based on the effect ofLi^+ substitution in $MgFe_2O_4$ nanomaterials corresponding to changes in their various properties at nanoscale. The Li^+ substituted $MgFe_2O_4$ nanomaterials were prepared by sol-gel method at low annealing temperature of 550^{o}C for 2 h. The production of a pure crystalline phase of $MgFe_2O_4$ with cubic spinel structure was explained by XRD analysis (Fd-3m space group). XRD study with cubic spinel structure revealed Li^+ replaced $MgFe_2O_4$ samples with varied concentrations. The average crystallite size and X-ray density of entire samples $Mg_{1-x}Li_xFe_2O_4$ (x= 0, 0.1, 0.2, 0.3 and 0.4) werefound using Scherer's equation between 24.28-36.18 nm and 4.335-4.497 g/cm^3, respectively. The crystallite size was noticed to decrease with increase in Li^+ concentration. For pure and Li+ substituted (x=0.4) $MgFe_2O_4$ of XRD data, Rietveld refinement was used to get refined diffraction parameters. For each sample, the lattice strain was determined using the W-H plot. The produced samples showed aggregation and porous structure in SEM micrographs, with average grain sizes increasing in the range of 0.66-2.20 m as Li^+ content rose. The FTIR spectroscopy revealed molecular vibrations (bending and stretching) of all sample in the range 439-3455 cm^{-1}. The force constant and bond length of **pure and Li^+ substituted (x=0.4) $MgFe_2O_4$also** evaluated. **The observed values of H_c, M_s and M_r for pure and Li^+ substituted (x=0.4) $MgFe_2O_4$are in the range of 143.8**-186.8**Oe, 24.43**-25.92 **emu/g and** 3.08-**4.22 emu/g, respectively.**It was discovered that as Li+ content increased, Hc decreased, while Ms and Mr values increased.The anisotropy constant (K) and Bohr magnetron number (n_B) of **for pure and Li^+ substituted (x=0.4) $MgFe_2O_4$** were also evaluated and found to be increase.The polarisation versus the applied electric field at 3 KV field voltage was investigated using ferroelectric characterizations at room temperature of pure and Li+ substituted (x=0.4) MgFe2O4.The P-E loops of **Li^+ substituted (x=0.4) $MgFe_2O_4$**contains reduced loop areas, indicating the decrease in electrical leakage current. In this case, the P-E loop behaves as a lossy capacitive loop.The obtained material may have great properties for antibacterial activity, biology, and the electronics sector.

Keywords: *Magnesium ferrite, Lithium, Structural analysis; Rietveld refinement; Ferroelectric; Magnetic property; Hydroelectric cell*

2026

Effect of Fuel Flow Analysis on a ECU controlled RCCI Engine with ETBE Blends

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Abstract : ETBE is an oxygenate that is used as an octane additive in gasoline. ETBE is created by combining isobutylene and ethanol in the presence of a catalyst. The use of alternative fuels has always had the capability to reduce carbon dioxide and other greenhouse gas emissions from automobiles and trucks, which account for the biggest chunk of greenhouse gas emissions. Alternative fuels are the best available option for outdated fossil resources because they reduce pollution, reduce oil imports, and can be produced sustainably. In this research, several experiments were conducted on RCCI engine and is operated with wire throttle positions. Later, various Loads and different blends of diesel with ETBE are tested to demonstrate the maximum return that can be habitual in terms of air need, fuel requirement, AFR, and volumetric outputs, and the results and justifications for this study are described. Moreover, it was shown that at lower speeds, AFR and volumetric efficiency are greater in both diesel and blends. Whereas fuel flow and airflow rise as speed increases.

Keywords*: ETBE, RCCI, ECU, Proportions, Fuel flow, Air flow, AFR.*

2028

Artificial Neural Network and Evolutionary Algorithms Based Optimization of Electrochemical Discharge Micromachining Process during Micro-channel Fabrication on Glass

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Abstract : It is a challenging task to generate micro-channel on brittle materials with higher machining depth by ECDM process. The paper consists model presentation of mechanical system into nonlinear ANN where input parameters are voltage, electrolyte concentration, duty ratio & pulse frequency and mathematical models for Tool wear rate (TWR) and heat affected zone (HAZ) are established during machining performances by micro-electro chemical discharge process. Influence of process parameters like voltage, duty ratio, pulse-frequency and electrolyte concentration on surface viewer of TWR and HAZ also illustrated during fabrication of micro-fluidic channel on silica glass. In this paper best fitted model during the cross validation has been identified by accuracy, Root Mean Square Error (RMSE), computation time & minimum cost value. The paper also includes finding out optimal parametric combinations during micro channel fabrication on silica glass where both Tool wear rate & Heat affected Zone are minimized using best different Evolutionary Algorithms like Differential Evolution (DE), Genetic Algorithm (GA) and Particle Swarm Optimization (PSO). It is found that the best fitted model is PSO-ANN and multi-response optimization parametric combination is 45volt, 20 wt% electrolyte, 60% duty ratio and 600Hz pulse frequency.

Keywords: Micro-ECDM; ANN; GA; PSO; Silica glass, Micro-channel

2030

Numerical Performance Analysis of a Twin Blade Drone Rotor Propeller

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Abstract : Twin blade propellers are typically used in applications that require precision flight control and agility due to its high relative efficiency. The thrust produced by twin blade propellers are low and hence are only used in lightweight drones focused on quick reflexes and speed rather than lifting capacity and stability. The present study focuses on developing a twin blade propeller model with improved torque and coefficient of performance with reduced vibrations and drag by numerical simulation analysis. The proposed blade design was modelled with blade angle of 30o to analyse its effects on the generation of propeller torque. The validity and accuracy of the developed numerical simulation model is influenced by the mesh and turbulence parameters of the developed model. In the present work, the turbulence factors were modelled by shear stress transport model and the meshing parameters were subjected to grid convergence study. The peak coefficient of performance (0.5810) and torque (1.1007 Nm) for the proposed twin blade propeller were observed for V = 15 m/s.

Keywords: Twin blade propeller, Reynolds number, coefficient of performance, torque, rake angle, numerical simulation

2031

Calculate the approximate volume of complex-shape solids

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Abstract : in this work, the Monte Carlo method (MC) was extended to calculate the volume of complex-shaped solids. The Monte Carlo method was studied, the basic factors affecting the accuracy of the calculation were analyzed and the mathematical principle under which the Monte Carlo method works for calculating area in two-dimensional spaces is explained in order to extend it for finding the volume of irregular-shape solid.

Keywords— Monte Carlo; volume; irregular-shaped; solid.

2035

Analysing a YSF precision locknut with the tighten loads of three fixed coppers and screws

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Abstract : The 3D model used in the paper is drawn by using Solid Works, which is a 3D solid model construction software. The model is drawn in two basic modules such as parts, and construction, and then the constructed parts are assembled to make a complete 3D YSF (M50x1.5P) precision locknut. For completing the whole analysis, firstly, the 3D model which is being constructed in the solid works is imported to the ANSYS workbench for analysis. Secondly, the appropriate boundary conditions of the model are set to get a successful analysis result. Thirdly, a moment is applied to the locknut to get the total deformation of 5μm on the touch surface of the inner ring, and also to generate a normal force on the inner ring. Finally, an axial force is applied in the opposite direction to three fixed screws and coppers, which results in the decreased deformation of the inner ring and the normal force generated on the inner ring. This paper shows the total deformation of 5μm on the touch surface of the inner ring and a normal force generated on the inner ring.

Keywords: Axial force; ANSYS workbench; Deformation; Precision locknut; Moment.

2036

Study on Self-curing concrete using Polyethylene Glycol 600 for highway infrastructure project

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Abstract : In this study, the self-curing concrete process has been utilized as an alternative to the normal curing process. Water plays an important role in the production of concrete and the curing process in infrastructure projects. The quality of water is mandatory for the normal curing process in a minimum period of 28 days for hydration and to attain strength. Curing of the concrete is a difficult task in infrastructure projects due to the scarcity of water. In this regard, this study introduced Polyethylene Glycol (PEG 600) as a self-curing practice for infrastructure projects in Ethiopia. For the M50 Grade mix, three different PEG 600 percentages (0.5, 1.0, 1.5, and 2.0) by weight of the cement have been designed. Finally, specimens were tested and compared to normal and self-cured concrete for mechanical strength properties. The study found that 1.5 % of PEG 600 with M50 grade concrete achieved maximum strength without compromising workability.
Keywords: Infrastructure projects, Polyethylene Glycol600, Self-Curing Concrete

2037

A Bibliometric Analysis on Graphene Nanoplatelet for Sustainable Material

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Abstract : Graphene nanoplatelet (GNP) has become the focus of researchers in industry and the academics. The adoption of GNP has been widely proposed in medicine, electronics, chemistry and construction over the years. Therefore, this paper performs a bibliometric analysis on the publications of GNP as listed on Scopus database from 2013 to 2022 with Harzing's Publish or Perish and VOSviewer. The patterns of GNP publications with regards to years, document types, source types, subject types, countries, co-authorships, source titles, popular materials, keywords and citation metrics are presented in this paper. Most materials were published in journals and listed under materials science. China, United States and India had the most contributions on GNP literature. GNP materials are expected to increase in the coming years. Future studies can be performed on other carbon based derivatives to understand their roles in various industries.

Keywords: Graphene nanoplatelet; Materials Science, Bibliometric Analysis

2039

Influence of E-Coli on Workability and Strength Characteristics of Self-Consolidating Geopolymer Concrete Based On GGBFS, Flyash and Alccofine

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Abstract : Construction sector across the world utilizes cement as one of the most relevant and efficient raw material. It is being estimated that by manufacturing one ton of cement, roughly one ton of CO_2 gas is emitted into atmosphere. With increasing awareness about global warming, development of alternative binding material that can replace cement completely has gained importance in construction sector. Many studies made on Geopolymer concrete (GPC) has proven its ability to replace cement in construction sector. This experimental investigation concentrates on completely replacing cement by alkali activated GGBFS, Fly ash and alccofine in self-consolidating concrete (SCC) mixes. The current investigation studies effect of E-Coli bacteria on workability and strength characteristics of Self-consolidating geopolymer concrete (SCGC). In this study 7 different SCGC mix samples were prepared by varying cell concentration of E-coli bacteria in order of 10^5 cells/ml, 10^7 cells/ml, $2X10^5$ cells/ml, $2X10^7$ cells/ml, $3X10^5$ cells/ml, $3X10^7$ cells/ml of alkaline liquids. Test results indicated that all fresh SCGC mixes with bacteria exhibited better workability with values satisfying EFNARC guidelines. SCGC mix containing E-Coli in cell concentration of $3X10^5$cells /ml gained maximum compressive strength of 36 MPa after 28 days of ambient curing. Bacterial survivability (Turbedimetric) test showed that incorporated bacterial cells remained active within the geopolymer matrix even after 28 days. XRD analysis indicated the formation of C-A-S-H, C-S-H, N-A-S-H along with minerals such as quartz, illite and mullite.

Keywords: Bacterial concrete; E-Coli; Alkali Activated; Self-consolidating; Fly ash; GGBFS; Alccofine; Geopolymer concrete.

2041

Optical properties of polymer blend of polymethyl methacrylate and polyvinyl chloride copolymer

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Abstract: In the present work we evaluated optical parameters of doped polymer blends (PVC / PMMA doped with iodine) such as optical energy gap (Eopt), absorption edge, optical dielectric constant, refractive index, constant B, $(n0B)^{-1}$ and N/m* are found to be compositional dependent. For increasing concentration of dopant. The refractive index (n0) Calculated in the range 400 to 1000 nm and also study the nature whether it is linear or nonlinearwith increasing content of iodinehave been evaluated. The ratio of carrier concentration to the effective mass (N/m*)have been evaluated.

Keywords*: Optical properties, PVC/PMMA blend, Optical constants.*

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Fabrication of Aloe vera Nanopowder by High energy ball mill process

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Abstract: Since Rigvedic, Aloe vera has been utilized for vitality, wellbeing, and medicinal reasons. Aloe vera is used for wound healing, curing burns, minimizing frostbite damage, preventing skin from x-ray damage, lung cancer, digestive disorders, raising high-density lipoprotein (HDL), and decreasing blood sugar in diabetics, combating acquired immune AIDS, allergies, and stimulating the immune system. In this work, aloe veranano powders are fabricated utilizing high energy planetary ball milling. The synthesized Aloe vera nanoparticles are characterized using Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Analysis (EDX).Moreover, to examine the chemical formation of the nanoparticles and to measure the particles, Fourier Transform Infrared Spectroscopy (FTIR) analysis has been performed. In addition, to determine the average size of the aloe vera nanoparticles, X-ray diffraction (XRD) on the specimen has been conducted. Under the estimated optimal milling conditions, it is notable that the particle size of the Aloe vera powders was effectively reduced well below 127nm.

Keywords: Aloe vera leaves; High energy planetary ball milling; Nano particle; Nanopowder synthesis techniques.

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Investigation of Tribological and Corrosion Performance of Duplex Electroless Ni-P/Ni-Cu-P Coatings

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Abstract : Duplex electroless Ni–P/Ni–Cu–P coatings are deposited on mild steel substrate using dual bath technique. Two types of coatings are developed with Ni-P and Ni-Cu-P as outer layers respectively. The coatings are heat-treated at temperatures ranging between 200 to 800°C. The coated samples are characterized for their microstructure, composition, and corrosion resistance for pre and post-heat-treated conditions. The energy dispersive X-ray analysis (EDX) of Ni-Cu-P outer layer and Ni-Cu-P inner layer coating showed that the coating composition are consistent with high phosphorous deposit. The microstructural and crystallographic structure of the duplex coatings are studied using scanning electron microscopy (SEM), and X-ray diffraction analysis (XRD) techniques respectively. The study reveals that both the duplex coatings seem to offer good protection to the substrate surface. Heat-treated samples displayed crystalline phases viz. nickel-copper (NiCu) nickel phosphide (Ni_3P), and copper phosphide (Cu_3P). The friction and wear behavior are evaluated in a pin-on disc setup. Also, the hardness of the pre and post heat treated coating is determined by Vickers microhardness tester. Corrosion tests on duplex coatings reveal that lower E_{corr} and i_{corr} valuesare obtained for as-deposited coating with Ni-Cu-P as the outer layer deposition. As-deposited coating displays better corrosion resistance for Ni-Cu-P as the outer layer of deposition.

Keywords: Duplex coating; Electroless; Ni-P; Ni-Cu-P; Friction; Wear; Corrosion;

2046

Compact, Robust and Low-Profile Textile Antennas for Bio-Medical Applications with Upgraded Bandwidth for Integration of Easy Garment

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Abstract. Now-a-days usage of wearable textile garments for the evolution of the microstrip antennas has been paced because of the reduction of size of the wireless devices. These employed wearable antennas are different from the regular antennas. In addition to this, these antennas provide immense robustness when imposed to structural deformation. To upgrade the bandwidth and to decrease the footprint, these particular antennas are proposed. The design of these antennas is best suited to use with our regular wearable clothes for communication. This paper gives the brief overview of the development and design of four textile patch antennas. The antennas are designed to operate at a frequency of 2.45GHz. The analysis of performance of these designed patch antennas is done under the free space conditions to check correspondence with the wearable implementations. Main motive of our antennas is to provide the flexibility that is suitable for wearable applications for Body area networks. To demonstrate the compatibility of these antennas for wireless applications on human body, the simulations results like gain, directivity, reflection coefficient and Specific absorption rate are obtained. The simulation results are compared for the different antenna designs and by observing the results it is clear that antenna is well suited for WBAN applications.

Keywords: *Fabric Antennas, Body Protective Garments, WLAN, SAR.*

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Improved Room Temperature Gas Sensing Performances of Pristine WO_3 Nano Particles

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Abstract : This paper reports the synthesis of polycrystalline monoclinic tungsten tri-oxide (WO_3) nanoparticles (NPs) were prepared by hydrothermal route and they were successfully examined as gas sensing materials for monitoring lethal volatile organic compounds (VOCs) at room temperature. The physicochemical properties of the prepared NPs were analysed. By examining the changes in the electrical resistance of the sensing material towards reducing VOCs, the Gas sensing characteristics were analysed and reported. The sensing mechanism and the various gas sensing characteristics have also been investigated. From the experimental results WO_3 calcined @ 550ºC exhibited quite good sensing response at room temperature.

Keywords: Gas sensor, WO_3, Nano particles, Hydro thermal route ;

2050

Adsorption of Cytosine on Si and Ge doped Graphene: A DFT Study

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Abstract : This study describes how the cytosine adsorption on Si and Ge doped Graphene using density functional theory (DFT) calculations. The adsorption energies of cytosine on Si- and Ge-doped Graphene are computed. We used a hybrid B3LYP method with 6-31G (d,p) and LANL2DZ basis sets for the order to determine the HOMO and LUMO states, as well as descriptors; and charge distribution potential. According to charge distributions, both Ge-doped and Si-doped graphene structures are sensitive to the cytosine base. When cytosine was adsorbed on Ge- and Si-doped graphene structures, the Highest Occupied Molecular Orbital - Lowest Unoccupied Molecular Orbital (HOMO-LUMO) gap decreased. This finding implies that the electrical conductivity of both systems has increased. As a result, Ge- and Si-doped graphene structures might be introduced as a strong adsorbent for biosensor applications in various fields.

Keywords: Si-Ge doped Graphene; HOMO-LUMO; NBO; DOS;DNA base cytosine

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Influence of ALR on SMD in 3-D Air-blast Atomization using CFD

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Abstract : In this paper, the performance of an air-water coaxial injector is investigated numerically to see the effect of ALR (Air to Liquid mass Ratio) on SMD (Sauter Mean Diameter) using ANSYS FLUENT. The simulation has been performed over a wide range of air velocities (155 m/s -190 m/s) and ALR (14 – 18), keeping the mass flow of water constant. The cross-sectional flow areas of water and air and other parameters are kept constant except for air velocity, as air velocity is directly related to mass flow rate. The highest atomization of water particles is observed at 190 m/s velocities of air, and SMD was also minimum at the same velocity as they are both mutually interrelated. SMD will also be dependent on Reynolds Number (Re), and Weber number (We) as Reynolds is related to velocity, and weber number is related to surface tension. SST k – ω turbulence model is used to solve the RANS (Reynolds Average Navier Stokes) equation.

Keywords:Air to Liquid Mas Ratio, Sauter Mean Diameter, Discrete Phase Model, Weber Number, Air-Blast Atomizer

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Process parameters and their effect on structure and morphology of gadolinium doped ceria

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Abstract : Gadolinium doped ceria $Ce_{1-x}Gd_xO_{2-\delta}$ (x = 0 and 0.20) materials for intermediate temperature solid oxide fuel cells (IT-SOFCs) has been synthesized by ultrasound-assisted sol-gel combustion method. X-ray diffraction (XRD), Raman spectroscopy, and scanning electron microscopy (SEM) were used to evaluate the structural properties of both materials. The XRD results confirmed the formation of cubic fluorite structure. Whereas, the formation of oxygen vacancies has been confirmed by Raman spectroscopy. The SEM images showed reduction of grain size with the addition of gadolinium cation. The results are discussed in light of various process parameters and their effect on single phase formation.

Keywords: Sol-gel; XRD; Raman spectroscopy; microstructure

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Thickness Dependent Tungsten trioxide Thin Films Deposited Using DC Magnetron Sputtering for Electrochromic Applications

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Abstract DC magnetron sputtering was used to grow tungsten oxide (WO_3) thin films on FTO and corning substrates.SEM, XRD, Electrochemical Analyzer, and UV–Vis Spectrometer were used to analyze surface morphology, structural properties, electrochromic characteristics, and optical characteristics. At an 800 nm wavelength, a decrease in thin-film thickness increased optical transmittance from 87% to 95%.Furthermore, coloring efficiency was observed to vary with the thickness of thin films for both 500nm and 375nm are 10.34 cm^2 C^{-1} to 18.57 cm^2 C^{-1}.In comparison to the high thickness thin film, the lesser thickness deposited nano-thin film has a higher diffusion coefficient. At 8×10^{-6}mbar partial pressure, the diffusion coefficients for the smaller and the high thickness thin film are $7.28x10^{-14}$ cm^2s^{-1} and $6.0x10^{-14}$ cm^2s^{-1}, respectively. The diffusion coefficient and coloring efficiency have been found to have a considerable influence on the thickness and surface-to-volume ratio, which could be important in electrochromic applications.

Keywords*: FTO substrates, hybrid thin films, WO_3, corning glass, Electrochromism.*

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Variation of Optical Parameters of Physically Stacked Polyvinylidene Chloride Films with Thickness and Wavelength

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Abstract : A study of thickness and wavelength dispersion of the optical parameters for thin physically stacked films of polyvinylidene chloride (PVDC), namely, refractive index, skin depth and dielectric constant has been performed. The refractive index and dielectric constant of these PVDC films initially increases with increasing film thickness, but for film thickness greater than 0.0048 cm, it is observed that these parameters vary with thickness to a much lesser extent, but continues to vary significantly with wavelength. The observations are discussed in terms of variation of average values of these optical parameters, along with errors estimated from residual analysis. The variation of these parameters with wavelength of electromagnetic radiation in the visible region (varying from 400 nm up to 700 nm) is presented and discussed. The analysis of the UV-visible spectra revealed the existence of both direct and indirect transitions in k-space. The optical band gap depends on the thickness of the films, which also causes significant changes in all other optical parameters of PVDC films.

Keywords: Polyvinylidene Chloride; Optical Analysis; Skin depth; Refractive index; Dielectric constant; Optical band gap

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Evaluating the Quality Factors of Leaf Plates by Fuzzy TOPSIS Method

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Abstract : Globally people are willing to change their habits in order to reduce their environmental impact. A continuous transition is taking place with a growing emphasis on sustainable materials. The leaf plates are environment friendly, biodegradable, durable for longer storage periods and easily disposable. This paper deals with TOPSIS method on complex picture fuzzy soft set. A score function with refusal degree on complex picture fuzzy soft set is determined. An entropy measure defined is used for calculating the weights. The positive and negative ideal solutions for complex picture fuzzy soft set are found. The relative closeness coefficient is calculated and based on these values the alternatives are ranked. Four types of leaf plates which are Bamboo, Siali, Palm leaf and Bagasse are chosen. These plates aretested for their durability, biodegradable and thermal resistance properties. Results reveal that among these four types of disposable plates, Siali leaf plateis the best.

Keywords: Complex picture fuzzy soft set; entropy function; ideal solution; TOPSIS method; leaf plates

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Strength and Workability characteristics of Hybrid Bamboo and Steel Fiber Reinforced Concrete

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Abstract Fiber-reinforced concrete (FRC) is a type of concrete reinforcement that has random distribution of fibers to improve the structural integrity. The fibers in concrete help to reduce shrinkage cracks, boost strength, increase energy absorption, and reduce harmful spalling at high temperatures.FRC is available in many different types and quality, each with its own set of advantages.Among them Steel fiber are commonly utilized in construction, but it is expensive. Bamboo fiber, as a type of green construction material, can be utilized in infrastructures as a Hybrid fiber reinforced concrete to improve the concrete's mechanical qualities. This research was carried out to examine the basic concrete properties such as compressive strength, split tensile strength, and workability by varying the proportions of bamboo and steel fibres in volume of concrete at 0%, 0.5%, 0.75% 1.0% and then the results were analyzed. According to the results through the study, it is proven that the hybrid bamboo and steel fiber reinforced concrete could be an alternative for reinforcing concrete.

Keywords: Bamboo fiber; Steel fiber; split tensile strength; workability; compressive strength;

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Performance study of Amorphous-Si thin-film solar cell for the recent application in photovoltaics

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Abstract : Cost-effective materials for photovoltaics are the emerging issue for the efficient building integrated photovoltaic (BIPV) system. Amorphous silicon (a-Si) thin-film PV cell having low cost, lightweight andhas excellent potential for the BIPV system. They are manufactured efficiently, and their application area is much more comprehensive. This paper examines a-Si PV module for performance measurement by observing various output characteristics with variable weather conditions. Temperature and irradiation are the leading cause of alteration of the module performance. The dynamic weather condition has discussed a detailed analysis regarding open circuit voltage, short circuit current, and maximum PowerPoint. The simulation and the result analysis have been presented using Matlab Simulink. The electrical characteristics like output voltage and current have been discussed with variable sun irradiation and temperature. Also, normalised efficiency has been plotted in excel from I-V, and the P-V curve was found from simulation to find the effectiveness in the required application.
Keywords: PV module; temperature; irradiation; Matlab Simulink; datasheet

2072

Analysis of Morphological and Electro-optical Properties of Silica Nanoparticles induced Vertically Aligned Liquid Crystal - Effect of Doping and Coating Techniques

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Abstract : Conventionally, polyimide (PI) coating materials are used on the indium tin oxide (ITO) glass substrates to induce the vertical alignment (VA) of nematic liquid crystals (LCs). However, this coating technique requires couple of steps such as spin coating, high temperature baking and mechanical rubbing which limits their applicability to flexible LC display device applications. In the present work, VA of nematic LCs in confined cell is induced using two different approaches: one via doping of silica nanoparticles (SNPs) as guest particles in LCs and other with the deposition of SNPs layer on ITO glass substrates. Further, morphological and electro-optical (E-O) studies have been studied for the SNPs doped and SNPs coated vertically aligned liquid crystals (VALCs). The morphological study shows the identical degree of dark (black) and bright (white) textures of SNPs doped and coated VALC cells at OFF and ON states, respectively under the crossed polarizers. Also, the VA of nematic LC molecules in confined cells has been confirmed from the conoscopic behaviour. Consequently, morphological and E-O results revealed that the threshold (V_{th}) and operating (V_o) voltages required to switch the LCs from their initial VA (black state) towards: minimum transition planar state and complete planar (bright) state, respectively, are reduced with better contrast ratio (CR) in SNPs coated VALC cell as compared with SNPs doped VALC cell.

Keywords: Vertical Alignment, Liquid Crystals, Silica Nanoparticles, Polyimide, Indium Tin Oxide, Morphological and Electro-Optical

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Myristica fragrans assisted Copper Nanoparticles and analyzing the antibacterial activity of Kaempferol

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Abstract Most microbiological growth inhibitors are chemical. Toxic and antimicrobial, chemical solvents are harmful to human health. Metallic nanoparticles (copper, silver, and gold) have several applications in biotechnology and biomedical research. Copper nanoparticles (CuNPs) are potent antimicrobial, anti-inflammatory, and anti- proliferative agents. Aims of this study were to biogenically produce copper nanoparticles using nutmeg, a seed from the *Myristica fragrans* plant. *Myristica fragrans* CuNPs were made by dissolving copper sulphate in extract. They were described using FTIR, EDX, and SEM. SEM measurements place these CuNPs' sizes between 20µm and 200 nm. EDAX analysis confirmed the presence of copper and oxygen, as well as the oxidation state of the metal. FTIR spectroscopy revealed unique functional groups in the nanoparticles. Extraction of *Myristica fragrans* seed extract was evaluated for antibacterial activity. The best antibacterial activity was discovered in *Myrsitica fragrans* seed extract. These results imply that antibacterial CuNPs phyto-formulated with nutmeg extracts might be used to treat microbial infections in the future.

Keywords: Myristica fragrans; SEM; FTIR; Copper nanoparticles; Antibacterial activity

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Analysis of Two-Storey Masonry Structure under Blast Loading

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Abstract : The present study focuses on the blast response of two-storey masonry structure having varying area of opening on the frontal wall. Four different numerical models: M1 having total opening area 2000mm2, M2 having total opening area 4000mm2, M3 having total opening area 8000mm2 and M4 having total opening area 12000mm2 were considered. The blast load time history for 1000kg explosive and standoff distance 15m were developed using Indian standard. The nodal-force method was adopted and blast load was applied on each node of the finite element model. The results of the analysis were reported and compared in terms of major principal stress, minor principal stress and direct shear stress. The effect of opening area on blast response of masonry models was found to be quite significant.

Keywords: Masonry, blast load, nodal-force method, major principal stress, minor principal stress, direct shear stress.

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Ultra-Fine Grained Commercial Pure Titanium for Load-Bearing Applications

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Abstract : In this study, the commercially pure Titanium (Cp-Ti) sheets were subjected to repetitive corrugation and straightening (RCS) technique for up to 12 passes. The processed samples were characterized for their grain refinement, tensile strength and *in-vitro* bioactivity. The optical micrograph revealed that the grain size of Cp-Ti is reduced to 5 µm after 12 passes. The tensile strength of the processed sample was found to increase by 80.3% as compared to the conventional Cp-Tisamples. The *in-vitro* bioactivity when immersed in simulated body fluid showed dense and homogenous apatite on the RCS processed samples indicating an enhancement in bioactivity.

Keywords: commercially pure titanium; severe plastic deformation; RCS technique; mechanical strength; bioactivity

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Prioritization of forging die design criteria based on failure analysis using fuzzy analytic hierarchy process (FAHP)

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Abstract : Design of forging dies involves various design criteria starting from selection of material to finisher design. These design criteria decide the failure and life of the dies. So, for better design of dies it is sometimes inevitable to prioritize one design criterion over other. In general, the prioritization is done based on the expertise of the design engineer which is not always reliable. So, it is important to decide which criteria is preferred over the other. The prioritization of criteria can be done using analytical methods. In the present work, the design criteria are prioritized using analytical hierarchy process (AHP). The prioritization is further improved by fuzzification (fuzzy analytical hierarchy process – FAHP) to included intermediate value which were not considered during AHP. The ranking obtained by AHP and FAHP are compared with the traditional Failure Mode and Effects Analysis (FMEA). It is observed that the prioritization of criteria obtained from FAHP is superior to the prioritization obtained from FMEA.

Keywords: FMEA, die failure analysis, AHP, FAHP, die life, forging die design

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Opto-electrical Characteristics of Silver Nitrate-doped Polyvinyl Alcohol Films

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Abstract : The pure and silver nitrate-doped polyvinyl alcohol films were synthesized using Dip Coating method. The effect of silver nitrate ($AgNO_3$) concentration on the electrical and optical properties of polyvinyl alcohol (PVA) films were investigated. The synthesized composite films were characterized by UV-Visible Spectroscopy, FTIR and Raman spectroscopy techniques. It was observed that the electrical conductivity of composite film increased with concentration of the dopant ($AgNO_3$) due to charge transfer complexes. I–V characteristics indicated that Schottky emission is the dominant charge transport mechanism in both undoped and $AgNO_3$-doped films. Increased absorption of visible light was observed for composite films with different concentration of $AgNO_3$. The optical quality for composite films increased as compared to pure PVA films. The composite films showed reduction in the band gap energy with increasing concentration of $AgNO_3$. The characteristic peaks of both PVA and $AgNO_3$ can be clearly observed in Raman spectroscopy. Obtained results showed that PVA+$AgNO_3$ dominates in many aspects with increasing concentration of $AgNO_3$ and these composite films would hold suitable potential for the applications in providing conducting surfaces for chemical and electronic industries.
Keywords: PVA, $AgNO_3$, Thin Films, Electrical Conductivity, Optical Absorption

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An integrated approach of FEM analysis using DEFORM 3D and experimental investigation of forces developed in Al-Si7Mg

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Abstract : The machining process is a vital role in manufacturing industries. This work takes an alternative method to predict machining parameters and related to the machining process can be fulfilled to introducing process simulation by finite element analysis (FEM). This research article reveals FEM based simulation model of cutting force in turning on Al-Si7Mg. The result indicates an increase in cutting force with rise in the rate of feed. The predicted force generated during cutting were compared with the experiment results, an acceptable error percentage of 9% has been achieved. The FE simulations give direction to manufacturers to pick out the effective cutting conditions for the precision machining process while not conducting too several expensive experimental runs. In order to effectively fulfil the process analysis, surface roughness (Ra) and material removal rate (MRR) have been investigated and examined. The main interaction effect of machining parameters was examined to show that material removal rate is increase with a decrease in cutting speed, while surface roughness is decreased with increases in cutting speed.

Keywords: Cutting force, Material removal rate, Surface roughness, Taguchi design, DEFORM 3D,

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Experimental investigation on performance, emission and combustion characteristics of neem oil bio diesel using ethanol blend

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Abstract : The prices of conventional fuels are increasing day by day due to technological constraints, over exploitation of resources and the gap in demand and supply. Environmental pollution is also increasing by the usage of crude oils and hence there is a need for exploration of alternative fuel sources with less or low harm to nature is to be selected for automobile and other applications. Bio-diesel blended with extracts from organic sources is that alternative fuel which is derived and treated chemically to suit the applications. In the present investigation the alternative fuel blend that we selected is neem oil, as it is available easily. In the initial stage the tests are conducted on the computerized 4-stroke single cylinder water cooled DICI diesel engine for diesel and base line data is generated. Further in the second stage experimental investigations are carried out on the same engine with same operating parameters by using the neem oil and ethanol blended diesel with the ratios 7:2:1, 6.5:2:1.5 and 6:2:2 of Diesel, Neem oil and ethanol in the respective blends. The results show the performance parameters and emissions of all the blends. The alternate fuel blend which has shown better performance in terms of engine performance and emission control is there by the selected as the optimum blend. Finally, the performance and emission parameters obtained by the above test are compared with the base line data obtained earlier by using diesel. The blends are to be tested further in the conventional vehicles for the blends end results.

Keywords: Conventional fuels, Bio- diesel & Crude oil

2081

Effect of PCM thickness and nano-additive on the cooling performance of Stearic Acid based Battery Thermal Management

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Abstract : The growing dependence on conventional internal combustion engines (ICEs) has resulted in the depletion of fossil fuels and an increase in global warming. Electric vehicles (EVs) are fast evolving to become a substitute for the ICEs. EVs use lithium-ion batteries to derive power. However, for optimum performance of the battery, it is essential to maintain its temperature below 333.15K. It can be achieved by passive cooling methods using phase change materials (PCM). Stearic acid, a type of organic PCM, is used in this study because of its non-corrosive, non-toxic nature, and high latent heat. The 3D simulation of the Battery Thermal Management system (BTMS) was used for optimizing the PCM for different PCM thicknesses of 2mm–12mm and additive percentages of 0%–6%CuO nanoparticles. The simulation results have shown that the stearic acid-based PCM is effective in controlling the cell temperature. The lowest cell temperature attained was found to be 311.934K.

Keywords: Phase changing material; Battery thermal management system; Electric vehicle; Fatty Acid; passive cooling; Simulation

2082

Decision making problem on sustainable building material

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Abstract : In this paper TOPSIS method on IVPFSS is dealt with. A score function with refusal degree on IVPFSS is defined. An entropy on IVPFSS is defined and is used for calculating the weights. The positive and negative ideal solutions for IVPFSS are found. Five green building materials bamboo, cork, timbercrete, reclaimed wood and straw bales are evaluated based on the parameters flexibility, tensile strength, energy efficiency, shear stress, durability and cost. The relative closeness coefficient of these materials are calculated and ranked. It is found that among these materials timbercrete is the best.

Keywords: Interval valued picture fuzzy soft set; entropy function; TOPSIS method; green materials

2083

Stress Analysis of Laminated Graphite Fiber Reinforced Polymer Panel Stiffened Joint with 45^0 Fiber Orientation

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Abstract : Large composite panels are extensively used in the aircraft industry. These panels generally collapse under a variety of stress and boundary conditions. For added stiffness, the panel is reinforced with a flange and supported by a web. For an arrangement of such kind of composite panels, this paper studies a three-dimensional finite element stress analysis on a firm panel made up of a web, flange, and panel with an interface between the flange and the panel. The effect of anisotropy, ply orientation, and layer stacking order on stress components is considered. A graphite fibre reinforced polymeric (GFRP) composite is selected for examination. $[45^0/–45^0/45^0/–45^0]_2$ and $[45^0/–45^0{}_2/45^0]_2$ angle-plied prepregs are taken. The linked stress failure criterion is used in this work to predict the location of damage initiation. A part damage indicator value of 1.00 would indicate that the structure has failed.

Keywords: Graphite Fiber Reinforced Polymer (GFRP); Finite Element Analysis; Stacking Sequence; Flange Stiffened Panel

2089

Assessment of physical and chemical water quality parameters using naive bayes control algorithm

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Abstract : In recent decades, one of the challenging issues faced by global nations is the degradation of water resources. Traditionally, water samples are manually collected from different locations to monitor its standards. Such conventional practices incur heavy cost, demand highly-skilled professionals, consume time and produce low precision results. Due to these drawbacks, these techniques are no longer considered to be efficient ones to monitor the water quality parameters continuously on real-time basis. In this background, the current study designed and developed a low-cost water quality monitoring system that can check the quality of water on real-time basis with the help of IoT. The methodology includes the analysis of physical and chemical water quality parameters. Various sensors are used to determine the water quality parameters in the proposed system namely, conductivity, turbidity and temperature. The data collection from the system is communicated via microcontroller system following Arduino model. Naïve Bayes theorem is used to analyse the data collected from the sensor to controller. Using this classifier, either one or multiple water quality parameters are checked in a specific location, leaving beside other parameters. The analysis produced highly accurate results and incurred less cost during implemented in comparison with other techniques.

Keywords: Naïve Bayes theorem; Water quality; Arduino; Internet of things; chemical materials.

2090

Design of Compact and Wideband Circularly Polarized Irregular Octagonal-Shaped Antenna Using Characteristic Mode Analysis

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Abstract : In this literature, a methodical designing process of a wideband and compact irregular octagonal shaped antenna which is circularly polarized using the characteristic mode analysis (CMA) is presented. For the designing process, firstly, an irregular octagonal shaped monopole has been designed for achieving the CP radiations for the higher frequency band, then a wrench shaped patch has been designed for achieving the CP radiations for bands having lower frequencies which in turn increases CP bandwidth of antenna. The classical way verifies the operation by simulating the surface current whereas the CMA technique gives more understanding about different modes of the structure and CP generation. This technique helps in the efficient optimization of the structure and helps in locating the optimal feeding position. The proposed antenna prototype has the compact size of 0.44λ x 0.44λ x 0.01λ (λ denotes the wavelength for lowest operating frequency). The proposed antenna has impedance BW of 86.58% (3.17- 8.01GHz) and the axial ratio 3dB fractional BW of 82.79% between 2.18GHz to 5.26 GHz and 13.72% between 7.33GHz to 8.41GHz. The peak value of gain for the antenna is 5.5 dBic. The radiation pattern for the proposed antenna is consistent throughout.

Keywords: Wideband antenna, CMA, circular polarization (CP), monopole, slot, patch;

2092

Parametric study of MHD, Heat absorption/generation and diffusion of mass on one dimensional unsteady, chemically reacting flow employing Finite Element method

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Abstract This paper explores unsteady MHD fluid governing flow considering a vertical plate in the presence of Hall current and heat absorption. The fixed wall temperature and diffusion of mass are concentrated. The physical significance of the governing fluid flow in terms of partial differential equations dominated by momentum field, energy flow field, and concentration equations. The mathematical partial derivative equations subjected to boundary equations, outputs are described by Galerkin Finite Element Method numerically. The numerical method FEM is employed in this paper due to its stability and convergence. The set of equations is framed by employing the Crank-Nickelson method and physical interpretations of nondimensional parameters with the governing fluid flow are illustrated graphically by using MATLAB software. It is witnessed that the impact of the strength of magnetic on primary velocity profile decreases whereas enhances in secondary velocity.

Keywords: Heat source/sink, Prandtl number, Chemical reaction, MHD, Groshof Number, Hall current, and Schmidt dimensionless number.

2093

Structural and spectroscopic properties of V_2O_5 doped zinc bismuth sodium borate glasses

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Abstract : Zinc bismuth sodium borate glasses with chemical composition $(50\text{-}x)Bi_2O_3\text{-}30B_2O_3\text{-}(x\text{-}0.5)ZnO\text{-}20Na_2CO_3+(0.5)V_2O_5$ [where x = 10, 15, 20, 25] were prepared by melt quenching technique. The prepared samples were studied by means of XRD, EPR, optical absorption and FTIR techniques. The amorphous nature was confirmed by the X-ray diffraction studies. The spin-Hamiltonian parameters (g & A) values, number of spins and paramagnetic susceptibility values have been calculated. The spin-Hamiltonian parameters indicate that the present glass samples are in octahedral sites with tetragonal distortion. The optical absorption spectra of VO^{2+} ions in the present glass system show single absorption band at ≈ 628 nm. The optical band gap energies (E_{opt}) and Urbach energies (ΔE) have been calculated from the ultraviolet edges. The FTIR spectra reveals the BO, BO_3, ZO, and BO_4 bands in the present glass system.

Key words: Bismuth Borate glasses, XRD, EPR studies, Optical absorption, FTIR studies.

2099

Artificial neural networks for predicting potentiodynamic tests of brass 70-30

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Abstract : In the present work an artificial neural network (ANN) was developed for the prediction of brass (70-30) potentiodynamic tests. Several samples of brass (70-30) at three types of molar concentration samples were characterized, a silver reference electrode was used in ammonium hydroxide (NH_4OH) electrolyte; the potential sweep was performed at 500 mv between the cathode side and the anode side. The neural network model was trained using 30 polarization curves and the ANN´s hidden layers were developed employing a hyperbolic tangent activation function. Furthermore, the error was adjusted by the Levenberg-Marquardt gradient descent method. Results obtained of the comparison between the experimental and simulated curves were satisfactory achieving a Pearson's coefficient of 0.90. Therefore, the predictive model is capable of being used as a data mining tool, auxiliary in the work of realization of polarization curves under the same experimental conditions.

Keywords: Artificial neural network, Brass, Polarization curves, Molar concentration, Artificial intelligence

3004

Influence of Prosopis Juliflora ash in Mechanical Properties of Concrete

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Abstract In the present world effective use of vegetative debris helps in ground water recharge and reduces the ecological contamination, which can be used as substitution for cementitious materials in concrete. In this study an experimental investigation is made in concrete blocks having partial replacement of Prosopis Juliflora ash (PJA) from 0% to 40% by weight of cement. Concrete under compression and tension are verified for seven days, fourteen days and twenty eight days curing. The experimental outcomes shows that concrete with 30% PJA has higher mechanical strength when compared with other specimens. SEM images shows that the ash fills the voids in the concrete and enhances the pore structure there by reducing the permeability in concrete

Keywords: Prosopis juliflora ash, Compressive strength, Split tensile strength, SEM analysis

3008

Fresh and hardened state properties of waste tire fiber and steel fiber reinforced concrete

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Abstract Concrete is a widely used construction material but is known that several properties of plain cement concrete can be improved by the addition of certain fibers in certain percentages and this procedure-oriented substance is known as Fiber-reinforced concrete (FRC). And one of such most commonly used fibers in steel fiber, which is known to improve the mechanical properties of concrete. The usage of the waste tire as fibers would reduce the environmental degradation and it is also proven that it too can improve the properties of PCC. This paper investigates certain fresh and hardened state properties namely workability, compressive strength, and abrasion of concrete reinforced with both steel and tire fibers in various proportions of the volume of concrete at 0%, 0.25%, 0.75%, 1%, and the results were analyzed.
Keywords: Waste Tire fiber; Steel fiber; work-ability; Abrasion; compressive strength

3010

Potentiality of tannery buffing chromium-containing solid waste in making concrete blocks

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Abstract : This work assess the potentiality of tannery buffing chromium-containing solid waste as supplement material for concrete work in the construction industry. The parameters determined to characterize the tannery buffing solid wastes are pH (7.2), moisture content (0.53%), carbon content (0.2%), volatile content (0.18%), and total chromium (28 mg/kg). The parameters used to compare the performance of the constructed concrete block with the standard concrete blocks are density, compressive strength, and water absorption. The experimental results confirmed that the density, compressive strength, and water absorption of the constructed concrete blocks are in the range of 1003.33 – 1226.7 kg/m^3, 5.33 – 8.62 N/mm^2, and 3 - 4 %, respectively which are comparable with the density (1383.3 kg/m^3), compressive strength (7.67 N/mm^2), and water absorption (4%) of the standard concrete block. These results indicating that the quality of concrete blocks constructed using tannery buffing solid waste is comparable with standard concrete blocks and proved as more promising supplement material for sand in constructing concrete blocks.

Keywords: tannery; waste; concrete; buffing dust; mixing; chromium

3014

Enhanced Scanning Rate of SIW-LWA with Continuous Beam Steering Using Delay Lines

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Abstract: A backward-to-forward continuous beam scanning leaky wave antenna (LWA) in substrate integrated waveguide (SIW) technology using delay lines is demonstrated in this study. A periodical H-shaped grooves on the top surface of SIW are etched to provide the slow-wave effect. Delay lines is introduced to change the group delay profile, increasing the SR. According to simulations, the presented LWA scans a broad angle in a limited bandwidth. Within the frequency range of 11.6 GHz to 12.3 GHz, scanning angle ranging from -41° to +31° (overall scanning angle of 72°) with scanning rate of 90°/GHz. This antenna has maximum gain of14.53 dBi at 11.9 GHz and 92.5% efficiency, which is acceptable considering the antenna's compact size.

Keywords: *Scanning rate (SR);leaky wave antenna (LWA); group delay (GD); Substrate integrated wave guide(SIW); Scanning rate enhancement.*

3015

Isothermal study on sorption of Lead from synthetic solution using Liagora Viscida

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Abstract : This paper deals with the preparation, characterization, and isothermal study on lead removal from synthetic solution using Liagora viscida biosorbent. The sorption experiments were performed by batch mode of operation and the parametric conditions studied are pH (2-8), contact time (1-180 min), and initial metal solution concentration (20-200 mg/L). Scanning electron microscopy (SEM) has been used to characterize the surface morphology of the Liagora viscida biosorbent. Langmuir, Freundlich, and Temkin isotherms were used to test the equilibrium data and found well fitted by Freundlich isotherm. In summary, the inexpensive marine algae Liagora viscida proved as an excellent biosorbent for the removal of lead from synthetic solution.

Keywords: Isotherm; biosorbent; lead; algae

3017

Effect of Cooling Technique and Tool Material on Inconel Alloy

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Abstract : This research investigates the influence of different cooling techniques such as cryogenic machining, cooling by vortex tube and MQL cooling on cutting force during turning of Inconel. Non-coated carbide tool, TiN and $Al2\ O3$ this tool inserts were used. Orthogonal L9 array by design of experiment was created for it.Cutting speed, feed rate, and tool type were all varied in turning studies. To assess machining efficiency, cutting force was assessed. The analysis of variance (ANOVA) was used to determine the ideal values and examine the impact of the cutting parameters on the cutting force under various cutting situations. The results showed that Al2O3 coated inserts had a higher cutting force when used with the specified cutting settings. A quadratic multiple regression model is used to determine the relationship between the independent and dependent variables. According to the statistical research, the feed rate has the greatest impact on the cutting force components when compared to the cutting speed.

Keywords: Cooling Techniques, Vortex jet Machining, MQL, Cryogenic Machining, Inconel Alloy, Cutting force

3018

Synthesis of PVA nano fibers by using Electro spinning

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Abstract : In the present study, Polyvinyl alcohol (PVA) nano-fibers are prepared by using electrospinning. The nano-fibers are characterised using optical microscope. The analysis has been carried out to study the impact of collection distance on the morphology of synthesized PVA nano-fibers. The nano-fibers were produced at different collection distances while keeping the other parameters constant. It is observed that the collection distance of 100mm and 120mmproduce denser coiled fibers with beads around the fiber. Bead diameter is reduced at 120mmdistance and completely disappears at collection distance greater than or equal to 140mm.

Keywords: electrospinning, PVA, nano-fibers, fiber diameter, collection distance;

3022

Hybridization Of µ-Electrochemical Discharge Machining (µ-ECDM) process: A Review

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Abstract : The Electrochemical Discharge Machining process is a non-conventional and a novel micro machining technique, which combines the advantage of ECM (chemical etching) and EDM (melting and vaporization) to machine hard, brittle and electrically non-conductive materials like glass, ceramics and composites with improved surface finish and machining rate. It is extensively used for making surface channels, microgrooves and micro-holes in glass. The necessity for hybridization of the ECDM process was triggered in order to improve the efficiency and machining performance of the process. The purpose of this article is to provide information in form of a review to readers on the existing triplex hybrid techniques of the ECDM process that is based on primary and secondary methods and its advantages have been discussed.

Keywords: ECDM; Hybridization; LA-ECDM; VA-ECDM; ECDG; PM-ECDM

3027

Effect of Core Losses on Thermal Analysis of 3ϕ- Squirrel Cage Induction Motor Using Lumped Parameter Thermal Model

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Abstract : The proposed Lumped Parameter Thermal Model (LPTM) is complex enough to predict temperatures in most parts of the 3ϕ- Squirrel Cage Induction Motor (3ϕ-SCIM), including the end winding and rotor surface temperatures. It is easily adaptable to a variety of frame sizes because it is formulated using dimensional information and constant thermal coefficients. The solution of linear differential equations adequately describes the thermal behavior of the 3ϕ-SCIM. The application of the thermal model on 15kW3ϕ-SCIM is discussed. The rise in temperature at different parts of motor is estimated considering variable copper and core loss. The maximum flux density derived from Finite Element Method (FEM) analysis, used to calculate core loss at various loads of a 3ϕ-SCIM. Variable core loss causes deviation in temperature rise, from the results, it is observed that, the relative percentage error considering variable core loss is about 19%.

Keywords: Lumped Parameter Thermal Model (LPTM), 3ϕ- Squirrel Cage Induction Motor (3ϕ-SCIM),Finite Element Method (FEM), Core Losses, Totally Enclosed Fan Cooled (TEFC)

3029

Evidence of Non-Debye Behavior of $Pb_{0.76}Sm_{0.24}Ti_{0.76}Fe_{0.24}O_3$ Ceramics by Complex Impedance Spectroscopy

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Abstract: The polycrystalline sample of $Pb_{0.76}Sm_{0.24}Ti_{0.76}Fe_{0.24}O_3$wasmanufacturedvia solid state reaction technique. Impedance Spectroscopy mode is utilized to evaluate the electrical parameters of the prepared sample throughout the frequency range of (100Hz-1MHz) at selected temperature range from 300°C- 400°C. The presence of relaxation is mainly supported by the nyquist plots which suggests that grains are more conductive than grain boundaries. Temperature dependent non-debye behavior of relaxation is confirmed by the electric modulus study. Because of the conduction through the hopping mechanism in the proposed sample, the universal Jonscher's power law is best fit to experimental data. The activation energies are 0.44eV, 0.56eV, and 0.288eV calculated from impedance, electric modulus, and conductivity are equivalent.

Keywords: Ac Impedance, Oxygen Vacancies, Relaxation Frequency, Hopping Mechanism, Cole -Cole mode.

3030

Static Structural Investigation of Helical Compression Spring Utilizing Different Materials for an Automobile Suspension System

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Abstract : This present work aims to perform the finite element analysis of a helical compression spring used in electric three-wheelers, taking into consideration a variety of road conditions. A helical compression spring stores energy in the shock absorber of an automotive suspension unit. The spring material needs to be elastic and have enough energy to tolerate external mass changes. The elastic characteristics of a spring material and its stability are investigated using static structural analysis in ANSYS. The selected spring materials for this current investigation are Spring Steel (SPS), Stainless Steel (SS), Mild Steel (MS), and Chromium Vanadium steel (CVS). The total deformation and equivalent von-mises stress of selected spring materials are predicted. A comparison has been made between the selected steels and the maximum deformation was found as 11.59 mm in both spring steel and chromium-vanadium steel. Hence, the best suitable spring material was selected based on equivalent Von-mises stress. The minimum von-mises stress has been observed at spring steel and the value is 911.0 MPa. Thus, the spring steel was selected as a suitable material for helical compression spring in road conditions.

Keywords: Spring, Structural, Stainless Steel, Spring Steel, Mild Steel, Chromium Vanadium Steel

3032

Investigations on optical and photoluminescence properties of Dy^{3+} doped zinc tellurite glass

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Abstract : Dy^{3+} doped zinc-sodium-tellurite glasses(TZND) with the chemical composition (70-x) %TeO2–20%ZnO–10%Na2O-x%Dy (where x is 0, 0.5 and 1 in mol%) were made using the traditional melt-quenching method. X-ray diffraction, SEM-EDS, optical absorption, and PL spectra were used to characterise the samples. The glass transition temperature of synthesised samples was determined using differential scanning calorimetry (DSC).The amorphous nature of the TZND glasses was confirmed by XRD measurement and composition were verified by EDS. The structural of glass matrices have been caried by Raman spectra. Other properties of prepared samples as density(ρ), molar volume (V_m), polaron radius r_p, oxygen packing density (OPD) and intermolecular distance r_i were calculated. From the absorption spectra, optical band gap, refractive index (n), cut-off wavelength and Urbach's energy values were calculated. In the photoluminescence characteristics two intense blue and red appeared and corresponding transitions are $^4F_{9/2} \rightarrow {}^6H_{15/2}$ and $^4F_{9/2} \rightarrow {}^6H_{13/2.}$

Key Words: *Tellurite glasses; X- Ray diffraction; SEM- EDS; Photoluminescence; Optical energy band gap.*

3035

Friction and Heat Treatment Studies on Al7075 Alloy Hybrid Composites

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Abstract : The Al7075 composites were subjected to friction testing in order to study the effect of multiple reinforcements and heat treatment. A tribological property like friction test was conducted to study the coefficient of friction at different parameters like varying sliding velocity and load.Overall this study presents the effect of different reinforcements like mica, graphite and E-glass fiber on tribological characteristics were studied. The heat treatment part was also paid particular attention as it is capable of changing microstructure and influencing the various properties. With an increase in load Coefficient of friction (COF) tends to decrease, but increases with increasing sliding velocity. Among the reinforcements combination Al7075/3%mica/5%graphite/4%E-glass showed lower value of COF due to inherent property of lubricating layer present in the graphite.

Keywords: Al7075; SEM; friction; Coefficient of Friction; XRD; EDAX

3036

Investigation of Mechanical Properties of Al6061 – Silicon Carbide, Red Mud Metal Matrix Composite

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Abstract : This paper reports on the mechanical properties of Al6061 based metal matrix composite reinforced with silicon carbide and red mud particles. Composites were prepared using the stir casting technique. A 0.5 HP electric motor, having a maximum rated speed of 300 rpm was used to drive the stirrer. Red mud content was varied from 2 wt% to 4 wt% in steps of 1 wt%, whereas silicon carbide was kept constant at 6 wt%. The mechanical properties of the composites such as tensile strength and hardness were examined by conducting experiments according to ASTM standards. The results demonstrated that the hardness along with the tensile strength of Al6061 alloy increased with the inclusion of silicon carbide and red mud reinforcements. SEM was carried out to evaluate the fracture surfaces.

Keywords: Al6061; Silicon Carbide; Red mud; Stir casing; Tensile Strength; Hardness; SEM.

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Wear and Heat Treatment Studies on Al7075 Alloy Hybrid Composites

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Abstract : The Al7075 composites were subjected to wear testing in order to study the effect of multiple reinforcements and heat treatment. A tribological property like wear test was conducted to study the wear rate at different parameters like varying sliding velocity and load. Overall this study presents the effect of different reinforcements like mica, graphite and E-glass fiber on tribological characteristics were studied. The heat treatment part was also paid particular attention as it is capable of changing microstructure and influencing the various properties. The wear rate of Al7075 was found to be higher while Al7075/3%mica/5%graphite/4%E-glass fiber composite was lower. Worn surface analysis showed that at lower load the wear mechanism operating is abrasive wear and at higher load it is combination of abrasive wear and delamination wear. Increase in sliding velocity showed hybrid composite in undergoing both abrasive wear, delamination wear and oxidative wear. Comparative analysis of worn surfaces of Al7075 alloy and its composites showed that before heat treatment the wear mechanism operating is delamination wear while after heat treatment it is abrasive wear.

Keywords: Al7075; SEM; Wear; XRD; EDAX

3039

Push-Out Tests of a New Prefabricated Shear Connector Using Normal and Steel Fiber Reinforced Concrete

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Abstract : An experimental investigation of a new type of shear stud was conducted using push-out experiments. The slabs were cast using two types of concrete: normal (NC), and steel fiber reinforced concrete(SFC). According to the experimental results, specimens cast with SFC had an increase in shear capacity of the connector of about (7.87 %) more than NC specimens, while the slip at the ultimate shear capacity was decreased about (16.23 %). The experimental results were compared with some standard design codes, demonstrating that they can be used to calculate the shear resistance of shear studs for both NC and SFC.

Keywords: push-out, shear stud, composite, shear resistance, slip, steel fiber

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A Novel Piezoelectric Energy Harvester Configuration for Performance Enhancement

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Abstract : This paper reports the novel design of a piezoelectric cantilever beam for energy harvesting applications. Finite element simulation is carried out for evaluating the effect of variation of geometrical parameters on the generated output. The effect of the thickness and area of novel piezoelectric structure on the output voltage is investigated. PZT-4, Barium Titanate, Lithium Niobate, Aluminium Niobate, PZT-5H, PZT-7A are some of the materials used for simulation. Aluminium nitride and PZT-7A have a higher output voltage generation as compared to other materials. The selection of different piezoelectric materials and the geometrical parameters of the beam has a continuous effect on the output voltage.

Keywords: Energy harvesting; Finite element method; Piezoelectric; potential distribution; piezoelectric materials.

3043

Eco-friendly produced superfine *Moringa oleifera* nanometric food powder and its characteristic effect on its structural, morphological and toxicity for varied applications as new functional nanomaterials

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Abstract : The present study investigates the characteristic changes brought in the structural and morphological properties of the *Moringa oleifera* leaf superfine nanoscale powder synthesized via High Energy Ball Milling machine and characterization was done by employing modern scientific tools. *Moringa oleifera* leaves were procured locally. The leaves were thoroughly washed to remove any contaminants followed by sun drying. The dried leaves were then ground coarsely in the mixer grinder for 10 mins. Some part of the coarsely ground powder was labelled as 0 hrs. and kept in an airtight container for further use. The remaining moringa oleifera powder was milled for 2.5 hrs., 5 hrs. and 7.5 hrs. respectively in High Energy Ball Milling Equipment. The XRD studies showed that the size of milled moringa oleifera powder was between 1nm to 100nm. The present study reveals surface morphology and crystal structure alteration due to different milling times. The TEM studies showed that the milled nanopowder is below 50 nm and is crystalline. Maximum absorbance for all four samples (MS 0 hr., MS 2.5 hr., MS 5 hr.& MS 7.5 hr.) was nearly identical at 400 nm and slightly lower at 270 nm and substantial absorption at about 650 nm within the visible spectrum, which could be attributed to the fact that there is the presence of protein and cellulose content in the samples. There was a considerable change in wavenumber but no change in the functional group was witnessed in FTIR at different milling times. A biomedical assay was also conducted to check the cell viability and cytotoxicity. The test used was MTT Assay; it is a colourimetric assay that is routinely employed in the fields of biology and biotechnology. It is the conversion of yellow-coloured tetrazolium salt to purple-coloured formazan using NADPH present inside the cell. The results indicated that cell viability also increases by increasing the milling hours. A dosage of 25µg/ml seems to be optimal for maintaining cell viabilityClick here and insert your abstract text.

Keywords: Moringa oleifera, Superfine powder, HR-TEM, MTT Assay, Functional food

3044

Growth of cerium oxide Nanorods by hydrothermal method and Electrochromic properties of CeO_2/WO_3 Hybrid thin films for smart window Applications

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Abstract: Innovative electro chromogenic nanomaterial's such as hybrids and also composite materials can improve electro chromic performance, because of its potential application qualities in electronic papers, low-power screens, automotive anti-reflect mirrors, and smart windows. In this study, we employed a hydrothermal technique to manufacture Cerium oxide Nano rods with varied ratios. In one stage, DC magnetron sputtering processes coat the produced cerium oxide nanostructures with a tungsten oxide coating. The surface palsmon effect changes with the size of Ce Nano rods, and this phenomenon influences electro chromic outcomes. Using a 0.5 M solution of H_2SO_4 as the electrolyte, the electro chromic performances of CeO_2/WO_3 nanorod-shell nanostructures on FTO-coated glass slides are investigated in the visible region. At 600 nm, these structures produce significant optical modulation (47%, 45%, and 50%) and colouring efficiency (7.60, 9.29, and 11.60 cm^2C^{-1} at 700 nm).

Keywords: *Nano composite; Cerium oxide nanorods; thin film; electrochromic; smart window.*

3047

Experimental investigation on Biosorption of Nickel using Neem Leaves

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Abstract : Contamination of heavy metals such as nickel ions in aquatic environment is a huge concern and that needs to be removed. The heavy metals releases from industries like non-ferrous metals, processing of minerals, formulation of paints etc. It needs greater concern in removal of heavy metals from industry effluents. Bio-sorption is a method to remove heavy metals from industrial waste water using neem leaves. In this work neem leaves are collected, washed with distilled water, dried and ground to 90 micron size. The particle size is constant in this work. The process variable are contact time, adsorbent dose and adsorbate (nickel) concentration. The contact time is varied from 0 to 180 min at an interval of 30 min, the adsorbent dose is varied from 1 to 4 gm, and the adsorbate concentration varied from 100 mg/L to 500 mg/L at an interval of 100 mg/L. From the resultsit can be observed that with increasing contact time, the more amount of nickel is adsorbing onto the surface of adsorbent. It could be due to the availability of enough surface of active sites at the early stage of adsorption. For all initial metal concentration, it can be observed that there is a more reduction in the concentration of nickel with increase in the adsorbent dosage. For a fixed adsorbent dosage the removal of nickel is decreasing with increasing the initial metal solution concentration.
Keywords: Biosorption, neem leaves, nickel removal, contact time, adsorbent dose.

3051

Effects of barrier chemicals on flame retardant properties of inherently flame retardant fabric

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Abstract : Barrier chemicals are used for coating a substrate fabric surface when air-proofness or water-proofness is desired in military operations. The properties of the base fabric changes depending upon the barrier chemical employed for coating. In this study, authors selected inherently flame retardant Kevlar as base fabric and coating was done using four chemicals viz: Natural rubber (NR), Polyurethane (PU), Neoprene, and Hypalon. While NR and PU readily burn, Neoprene and Hypalon resist ignition due to the presence of chlorine atom. The resultant flame retardant properties were studied using UL-94V and NFPA-701 methods. Although Kevlar is flame retardant in nature, it was observed that some coatings burned readily leaving behind charred base fabric.

Key Words: Barrier chemicals; Hypalon; Kevlar; Neoprene; Natural Rubber; Polyurethane.

3052

Evaluation of crystal size present in graphene oxide quantum dots using optical and Raman spectroscopy

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Abstract : Graphene is a two-dimensional allotrope of carbon, has received enormous research interest. Here we report, the evaluation of the crystal size of graphene oxide quantum dots (GO-QD) using optical and Raman spectroscopy. Raman studies indicate the D, G and D¨ band, indicates the formation of GO-QD. Crystal size was estimated using the Raman spectra, which is 4.2 nm, comparable to Bohr size, indicating the synthesis GO is a quantum dot. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), field emission scanning electron microscopy (FESEM), and Energy Dispersive X-ray Analysis (EDAX) were used to explore GO-QD, structural and physicochemical features. The XRD pattern revealed reflection planes (001) at $2\theta = 9.50°$. Crystal size was estimated using the Scherer equation, which is 2.2 nm, to support Raman results. Moreover, Optical spectra based Brus model and Hyperbolic Band (HB) models have been used for the estimation of size The presence of oxygen-containing functional groups in GO was confirmed using a Fourier-transform infrared spectrometer (FTIR). As determined by FTIR, oxygen-containing functional groups such as C-O, C=O, -OH, and C=C were inserted into graphite layers. FESEM revealed that graphene oxide quantum dots have a sheet-like morphology. The zeta potential is used to determine the surface charge of dispersed components in the solution and the stability of the produced Nanofluid. The results indicate that small suspended particles resist aggregation and are distributed uniformly in solution. Thus, the synthesized graphene oxide quantum dots exhibit several exciting and novel properties that make them appropriate for a wide variety of energy storage and conversion applications.

Keywords: Graphene oxide, Quantum dots, optical study, Zeta potential, Energy storage.

3053

Compact, Robust and Low-Profile Textile Antennas for Bio-Medical Applications with Upgraded Bandwidth for Integration of Easy Garment

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Abstract. Now-a-days usage of wearable textile garments for the evolution of the microstrip antennas has been paced because of the reduction of size of the wireless devices. These employed wearable antennas are different from the regular antennas. In addition to this, these antennas provide immense robustness when imposed to structural deformation. To upgrade the bandwidth and to decrease the footprint, these particular antennas are proposed. The design of these antennas is best suited to use with our regular wearable clothes for communication. This paper gives the brief overview of the development and design of four textile patch antennas. The antennas are designed to operate at a frequency of 2.45GHz. The analysis of performance of these designed patch antennas is done under the free space conditions to check correspondence with the wearable implementations. Main motive of our antennas is to provide the flexibility that is suitable for wearable applications for Body area networks. To demonstrate the compatibility of these antennas for wireless applications on human body, the simulations results like gain, directivity, reflection coefficient and Specific absorption rate are obtained. The simulation results are compared for the different antenna designs and by observing the results it is clear that antenna is well suited for WBAN applications.

Keywords: Fabric Antennas, Body Protective Garments, WLAN, SAR.

3059

Optimisation of Process Parameters for Inconel 718 Spur Gear

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Abstract : Computer Numerical Control Wire Electrical Discharge Machining (CNC-WEDM) is a thermoelectric non-conventional machining process. WEDM process is playing a pivotal role in the production of newer materials, especially for the aerospace and medical industries or high temperature application area. Using WEDM technology, complicated cuts as well as shapes can be made through difficult-to-machine electrically conductive components. The high degree of accuracy and the fine surface quality make WEDM valuable. The present investigation deals with the formulation of mathematical model for the modeling and analysis of the effects of machining parameters on the performance characteristics in the WEDM process of Inconel 718 alloy. The proposed model has been developed using a second order model of Taguchi Methodology to explain the influence of three significant machining parameters [Wire feed rate (WFR), Gap voltage (G), Peak Current (P) on the selected responses i.e. Material Removal Rate (MRR).

The separable influence of individual machining parameters and the interaction between these parameters are also investigated by using the Analysis of Variance (ANOVA). After analyzing the experimental as well as predicted results by formulating design matrix and through regression analysis it has been observed that the model adopted is of significant importance and the predicted results are in full coherence with the experimental findings.

Keywords: WEDM; Miniature Spur Gear; Material Removal Rate (MRR); ANOVA; Optimization

3062

Influence of Temperature on Oxygen Adsorption/Desorption properties of NEG Materials.

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Abstract : Highly porous alloys or powder materials of Ti, Zr, Al, V, Fe and other metals are considered as the base materials for non-evaporable getters as these contain variety of applications[1]. The sorption characteristics of the Ti-Co, Ti-Zr-V, Zr-V-Fe getter materials was investigated and reported by the earlier researchers[2, 3]. Hence, the present studies focus to investigate temperature impact on structural behaviour, phase changes, and oxygen sorption process of non-evaporable getter (NEG) materials. Two series of non-evaporable getter (NEG) materials having chemical compositions higher and lower concentrations such as (1) Ti-Co (60-40%) and (80-20%) (2) Zr-Co (60-40%) and (80-20%) have been prepared. These materials are characterized by HTXRD, TG/DTA, DSC, SEM with EDS. Materials are expected to show phase changes at elevated temperatures. Thus, XRD spectra have been recorded as a function of temperature (HTXRD)in the range 30to 700^0C. Variation in thermal behavior of the present materials is carried out by differential scanning calorimeter (DSC) in the temperature range30 to 400^0C. The DSC curves in the heating - cooling mode of the NEG materials exhibiting endothermic and exothermic behavior associated with the phase transition have been obtained. Oxygen adsorption/desorption properties are investigated by thermogravimetric analysis (TG/DTG) from the temperature 30^0C to 1000^0C. Scanning electron microscope(SEM)with energy dispersive spectroscopy (EDS).The aim of the present work is to understand the impact of rare earth elements as mentioned above on the behavior of present NEG materials.

***Key Words**: NEG Getters; Thermogravimetric Analysis; Oxygen Absorption.*

3063

Structural, Magnetic, Dielectric and Magneto-Dielectric response in $Pb_{0.75}La_{0.25}TiO_3$-$CoFe_2O_4$ composites

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Abstract: $_{(x)}Pb_{0.75}La_{0.25}TiO_3$- $_{(1-x)}CoFe_2O_4$ (where x = 0.40, 0.42, 0.44, 0.46, 0.48, 0.50) ceramic composites have been successfully synthesized by solid-state reaction route. The effect of stoichiometric proportions on structural, dielectric, magnetic and magneto dielectric properties have been explored. Presence of both tetragonal (ferroelectric) and spinel cubic (ferrite) phases has been indicated in the XRD pattern gives direct evidence of successful synthesis of composites. Room temperature magnetic hysteresis reveals that all samples exhibit ferromagnetic ordering and both saturation magnetization (M_s) as well remnant magnetization (M_r) seems to continuously decreases with decreasing $CoFe_2O_4$ concentration (~8.647 emu/g to 6.761 emu/g whereas saturation magnetization decreases from ~46 emu/g to 39 emu/g for x = 0.40 to x = 0.5). The dielectric constant has been varies but trend is not uniform because of contribution of dielectric constant from both ferroelectric as well as magnetic component. Variation in dielectric constant with magnetic field is an direct evidence of presence of magneto dielectric (MD) effect and has been increased towards higher frequency region may be due to increased ferroelectric component which has been responsible for more strained grains with magnetic field.

Keywords: *Multiferroics, Composites, Magnetodielectric, Dielectric*

3066

Parametric analysis and optimization of the chassis of a Go kart competition vehicle by means of computational software based on mathematical algorithms

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Abstract : This article details the mechanical analysis of a competition vehicle, considering the production of deformations caused by bending and torsional forces along the drive shaft, comparing the tenacity of three structural steel materials under study, also, it is analyzed by means of power transmission, dynamic parameters corresponding to speed, acceleration and slope in the presence of maximum torque, maximum speed and stop of the Go Kart vehicle by means of mathematical algorithms; In this way, it will be feasible to analyze the importance of the intervention of the angular velocity, kinematic chain configuration and resistance conditions in the transfer of forces of the competition vehicle, which will be optimized by means of Matlab during the operation and running of the vehicle.

Keywords: Go Kart; chassis; mechanical properties; AISI 4130; transmission system; optimization.

3073

Study of physical properties of homologous series of a ferroelectric liquid crystal

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Abstract : We present an experimental investigation of three homologues of a ferroelectric liquid crystal. The lowest and the highest derivative of the homologous series under investigation showed almost same value for spontaneous polarization, dielectric constant and optical switching time. An attempt is made to explain the influence of number of non-chiral side carbon atom on physical properties of homologous series of a ferroelectric liquid crystal at the molecular level.

Keywords: Liquid Crystals; dielectric; polarization

3074

The electrochemical degradation, wear behavior and machining of metal matrix composites based on 6xxx aluminum alloy with ceramic particulate reinforcements; A Brief Review

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Abstract : 6xxx series aluminum alloy based metal matrix composite materials are finding greater applicability in various fields like marine, aerospace and automobile industries. In fact the diverse nature of the availability of ceramic particles and the hybrid combinations of the reinforcements make them versatile in superior properties as well as applications. More over these composites are latest additions to the novel materials developed in recent decades and hence the end products of these composites are reaching the markets in recent times after several years of optimalisation studies. Hence it is appropriate to make a comprehensive study about 6xxx aluminum alloy based metal matric composites in terms of its corrosion behavior in aggressive environments , wear behavior in engineering applications and feasibility of manufacturing the end products using the composite.

Keywords: 6xxx Aluminum alloy. Metal matrix Composites , Manufacturing and corrosion behaviour.;

3078

Investigation of rheological properties in Shear Thickening Fluid for Seismic Dampers

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Abstract : The proposed work deals with the development of seismic damped structures with novelistic approach in steel structures. This study involves the material synthesis and characterization of shear thickening fluid with PEG (poly ethylene glycol) and nano silica powder in various proportions. The primary objective of the study is to determine the best mix proportion of the viscous fluid to be used in the structural damper by studying the rheological properties such as complex viscosity (Pa S x 10^3) shear rate ((1/s) (x 10^3)), shear stress, and strain of the fluid used. Tests were conducted from the results clarifies that the combination sample 5 obtains higher shear rate of and complex viscosity of when compared with the other samples. The damper was designed and fabricated for the proposed combination of shear thickening fluid to undergo seismic loads.

Keywords: Nano silica; Poly ethylene glycol; shear thickening fluid; rheology; complex viscosity.

3079

Stand-alone transformer-less multilevel inverter fed by solar energy for irrigation purposes

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Abstract : Shrinking water resources for irrigation purposes is a foremost global challenge for sustainable agriculture to produce human food and animal feed. Thus, it is so important to transmit water to the agricultural lands using a variety of tools such as pipes and pumps. It is established that most pumps are either powered by fossil fuels such as petrol, diesel, *etc*. or electrical energy from a utility. However, due to the pollution generated by burning fossil fuels and shortages in electricity distribution, it is crucial to use renewable energy resources such as solar energy to power electric water pumps for irrigation. The current paper proposes a design of a stand-alone transformer-less DC/AC converter powered by photovoltaic (PV) panels. The design consists of a cascade boost (CB) DC/DC converter coupled with a five-level inverter. The role of the CB is to achieve Maximum Power Point Tracking (MPPT) using a Fuzzy Logic Controller (FLC). Whereas, the role of the five-level inverter is to provide a constant AC voltage to drive a 1 hp “single-phase induction motor (SPIM)”. A 4800 W system is designed to operate several SPIM motors for irrigation purposes. The proposed system is successfully simulated using MATLAB SIMULINK.

Keywords: Cascade; DC/DC; Five-Level; Irrigation; MPPT;Single-phase;

3084

Development of optimum sustainable metakaolin replaced cement concrete based on homogeneity, compressive strength and rapid chloride ion penetration

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Abstract : Sustainable concrete mixtures with ordinary Portland cement and metakaolin were experimentally produced to investigate their effects on homogeneity (ultrasonic pulse velocity), compressive strength, and chloride ion penetration. Portland cement was partially replaced by metakaolin. The metakaolin replaced cement concrete mixtures were mix proportioned for 0% to 20% with 5% interval replacement to attain more than target compressive strength of 38.25 N/mm^2. The test results indicate that ordinary Portland cement replaced by 15% metakaolin is optimum sustainable concrete mixture based on this experimental study.

Keywords: Metakaolin; homogeneity; compressive strength; chloride ion penetration; optimum replacement; sustainable concrete

3086

Studies of optical and electronic characteristics of ternary zinc-tellurite glasses with varying Zn doping concentration

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Abstract : Ternary zinc-tellurite glasses of batch composition x%-(ZnO)-(90-x)%(TeO_2)-10%Na_2O with x = 5, 10, 15 and 20%, were synthesized by customary melting and quenching method. The morphological, physical, and optical characteristics of the material were investigated. Differential scanning calorimetry was done for glass transition temperature, whereas X-ray diffraction results justify the glassy nature of the samples. SEM-EDS give the information of surface morphology and batch composition. Structural information is gathered by Raman spectra. Physical parameters as density, oxygen packing density (OPD), Zn^{2+} concentration, poleron radius and inter atomic distance have been calculated. Optical properties such as coefficient of absorption, optical energy band gap, refractive index and Urbach's energy were calculated. The effect of ZnO concentration on physical and optical parameter has been studied.

Key Words: *Tellurite glasses; Raman spectra; Oxygen packing density (OPD); Optical energy band gap.*

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Silver nanoparticles synthesized by Brassica oleracea (Broccoli) acting as antifungal agent against Candida albicans

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Abstract : Development of cost-effective and eco-friendly methods of nanoparticle synthesis could play a crucial role in integrating nanotechnology and phytomedicine for biological applications. Using aqueous seed extract of Brassica *oleracea var. italica (Broccoli),* Silver nanoparticles (AgNPs) were synthesized by extracting Rutin, a bioactive component found in broccoli.in this study, the possible role of Brassica *oleracea var. italica (Broccoli),* extractis reducing silver nitrate into silver nanoparticles is highlighted. These biosynthesized nanoparticles were characterized with the help of Scanning electron microscopy, EDX, Fourier transform infrared spectroscopy, and was observed that Broccoli seed extract can reduce silver ions into silver nanoparticles with in 12min of reaction time. The color change from dark brown to pale brown affirmed the reduction of Ag+ to $Ag^{0.}$. Scanning electron microscopy images show the presence of silver nanoparticles in the size range of 1and 2µm.Rapid and ecofriendly biosynthesis of stable silver nanoparticles was observed in this study. With the help of Fourier transform infrared spectroscopy analysis, the possible role of proteins and phenols as reducing and capping agents was inferred. These silver nanoparticles synthesized from the biological route also showed promising antifungal(*Candida albicans*) effects against test microorganisms.

Keywords: Brassica oleracea var. italica Rutin; FTIR; SEM; silver nanoparticles, Candida albicans

3090

Prediction of Single Cylinder Direct Injection Diesel Engine Performance Fuelled with Lemon Peel Oil Biodiesel Using Artificial Neural Network

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Abstract: The aim of the present work is to predict the performance of single cylinder direct injection diesel engine fuelled with lemon peel oil biodiesel (B25) loaded by ceria nanoparticle additives and coated with yttria-ceria stabilized zirconia using Levenberg-Marquardt algorithm of single-input multiple-output artificial neural network (ANN). The dependent variables are brake power, indicated power, frictional power, brake thermal efficiency, indicated thermal efficiency, volumetric efficiency, fuel flowrate, air flowrate and specific fuel consumption at varying loads from 0-100%. The prediction ability of ANN was evaluated by determination coefficient (R2) and root mean square error (RMSE). The average R2 and RMSE of 0.93 and 0.82 show that the ANN fitted well to the experimental values of response variables at varying loads. The results also validate through correlation coefficient (R) of 0.99254.

Keywords: Artificial neural network, Engine performance, Load, Diesel, Lemon peel oil

3092

On Demand Reconfigurable Notch-Based UWB MIMO Antenna for Wireless Application

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Abstract- In this paper, on demand reconfigurable notch based UWB-MIMO antenna for wireless applications has been proposed. The proposed antenna consists of two square patch monopole radiators with inverted Z and extended U slots cut through them. Antenna offers good impedance matching (S11 < -10 dB) over the entire Ultra-Wide Band (2.9 - 13.4 GHz) spectrum. The connected ground structure is used to improve the isolation (S21 < -15 dB) over the entire operating band. Reconfigurability has been achieved using switching elements S1 and S2 which are inserted in the extended U slot and inverted Z slot in each radiator. When both the switches are OFF, notch mechanism is obtained on both the notches C band uplink (5.7 to 6.5 GHz) and C band downlink (3.6 to 4.2 GHz) simultaneously. When the Switch 1 is ON the notch is obtained at C band uplink (5.7 to 6.5 GHz) whereas when the Switch 2 is ON the notch is obtained at C band downlink (3.6 to 4.2 GHz). The proposed antenna offers a simulated bandwidth of 10.5 GHz along with a compact size of 34x20x1.6mm^3 with efficient port isolation of more than -15dB throughout the operating band. ECC and directive gain are less than 0.02 and more than 9.9 d Birespectively.

Keywords: MIMO, UWB, Reconfigurability, Isolation, Switching element, ECC, DG;

3098

The impact of plastic during the COVID-19 pandemic: The point of view of the environmental science literature

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Abstract : COVID-19 is the official name of the disease caused by a coronavirus called SARS-CoV-2. Since the beginning of the first cases of the new coronavirus, our society has been completely changed, and as a consequence of the changes, new environmental challenges were imposed, especially due to the large increase of using plastic materials present in packages and personal protective equipment such as face masks.

The impact of plastic during the COVID-19 pandemic will be discussed in the present work, through the point of the view of the environmental science literature, by using bibliographic analysis and mapping based on the results of a search in the Scopus database. Emphasis will be placed on the analysis of the authors' keywords of the publications.

Keywords: Plastic; COVID-19; environmental science; bibliometric analysis; bibliometric mapping

4002

Influence of Treated Coir Fiber on Durability Properties of Black Cotton Soil

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Abstract : The significance of Black cotton soil is its peculiar properties, that it will not contribute to durable foundation. Consequently, there are two options, ie., to remove the present weak soil and substitute it with non-expansive soil or to enhance the properties by stabilization. Several materials and techniques are available in stabilization of soil. Soil reinforcement is a technique that can be used to improve the engineering characteristics of expansive soils Use of natural fibres is one of the ecofriendly and cost-effective option to reinforce soil. Use of Randomly distributed fibre reinforced soil has convinced researchers to investigate more features and applications in practical scenarios. The present study aims at the durability of coir reinforced soil under various aggressive atmospheric exposures. Also, the Coir fibre is a decomposable material that tends to degrade under extreme aggressive conditions such as in polluted water, leachate, in alternate cycles of wetting and drying, freezing and thawing and so on. Even though, life of coir fibre in soil is predictable up to 8-10 years. But, due to various environmental exposures it may degrade fast. to improve the durability properties of coir fiber treatment of fibers is attempted and analysed by using this treated fiber in Black cotton soil in the present investigation.

Keywords: Block cotton Soil, Soil Stabilization, aggressive condition, Coir Fiber, CBR

4005

Micro Thermal Behavior of Ti- Mg Composite Processed through Friction Stir Processing

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Abstract : Friction Stir Processing (FSP) has expanded its regime in every domain where the enhancement of mechanical and other related properties of composite is desired. The current study involves addition of 4% magnesium in titanium to form a metal matrix composite through friction stir processing to evaluate thermal and microstructure characteristics of the resulting composite material. The composite material obtained through FSP is found to possess better thermal conductivity with a improvement ranging from 7.35% - 8.86% than the base material as the measured property increases with increase in temperature varying between 130°C - 530°C and slightly reduces at certain point. The microstructure analysis carried out ensures the presence of magnesium particle dispersed in titanium base metal. Regression equation developed for the percentage increase in thermal conductivity have resulted with low error percentage ranging between -2.4% to 8.44%. The study carried out ensures the potential of FSP in developing titanium based composites with improved thermal conductivity through addition of magnesium at a small volume fraction of 4%.

Keywords: Friction Stir Processing; Thermal Conductivity; Microstructure Analysis ; Ti-Mg Composite ; Regression Analysis

4006

Tribo-performance of Saw Dust Filled Natural Fiber – Glass Fiber Reinforcement Epoxy Composites: Modelling and Optimization

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Abstract : The tribological behaviour of a jute/glass hybrid epoxy composite made by hand layup with saw dust filler was investigated. The wear properties of the fibre reinforced composite were studied on the pin on disc tribology tester machine. The influence of natural filler, i.e., saw dust, on the wear behaviour of glass, jute, and epoxy hybrid composites is described in this work. The prediction model for wear loss and coefficient of friction as a function of sliding speed, filler content, and applied load was developed using RSM. The Taguchi method with an L_9 orthogonal array was used to find the optimum values of input parameters for minimum wear loss and coefficient of friction. The "smaller-is-better" characteristic was used to evaluate the signal-to-noise (S/N) ratios. An ANOVA was done to figure out how much each of the input factors affected the output responses.

Keywords: Glass jut hybrid composite; saw dust; tribological property; Response Surface Methodology; Taguchi

4011

Investigations of the combustion of diesel engine with anodizing of piston crown

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Abstract : To enhance the corrosion resistance of aluminium alloys, anodizing is one of the surface treatments exercised in industry. It is accomplished by making the work-piece anode while suspended in a suitable electrolytic cell at suitable temperature and voltage. Before anodizing process, an appropriate pretreatment of surface is necessary which consist of degreasing and pickling and purpose of these pre-treatments is to produce a chemically clean surface. For degreasing, the specimens are immersed in a special detergent that removes oils, grease and solid dust particles from metal surface. Pickling is employed to remove the natural oxides and other compounds from surface by means of a solution which acts chemically upon the compounds. Removal of oxide layer allows for a more conductive surface thus facilitating electrochemical processes such as anodizing. This paper reviews the surface characterization and to demonstrate the coupled effects of surface roughness and pre-treatments, degreasing and pickling, along with anodization on fatigue life of alloys.

Keywords: Anodizing Process; Pretreatment; degreasing; pickling; Hard Anodizing.

4012

Hydrogen adsorption behaviour in Graphene Oxide doped Ni/Pd@f-MWCNTs - A sustainable cleaner energy approach.

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Abstract : Rapid industrialization and globalization enhanced the stress on natural resources for the fuel in the transportation sector and resulted in causing atmospheric pollution leading to global climate change. Thus, alternative fuels are needed to reduce the emissions from vehicles. Hydrogen is considered an alternative fuel for the running of vehicles, wherein the recent years, many researchers have been focusing. In the current study, Ni/Pd nanoparticle decorated multiwalled carbon nanotubes were synthesized using three different solvents, i.e., triethylamine, dimethyl fluoride and water. The characteristics of these materials are examined through scanning electron microscopy and surface area analysis and further analyzed for the sorption of Hydrogen with the help of BELSORP HP for adsorption isotherms. The experiment found that the solvents used to prepare the multiwalled carbon nanotubes played an essential role in controlling the nanoparticles and uniform distribution without forming clusters. The decorating of Ni/Pd nanoparticles for the pristine and functionalized carboxylate MWCNTs adsorbed the Hydrogen by showing enhanced capacities differing from 0.25 to 2.97 and 0.06 to 1.56 wt % at 77 K and 298 K.

Keywords: Graphene Oxide; Hydrogen; Transportation; Storage; Nickel; Palladium

4014

Experimental investigation on cutting force during end milling of AISI D2 tool steel using AlCrN coated tool

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Abstract : D-grade tool steels are excellent contenders while selecting materials in die and mould industry. Die and mould making industries are extensively using high strength and high hardened AISI D2 tool steel. However, AISI D2 tool steel is very difficult to machine due to high hardness which causes excessive tool wear rate. Coating can be effectively improved the tool life during machining of hardened materials. Under prevailing machining scenario and scope of usage of AISI D2 tool steel, the end milling process parameters optimization is the most extreme need of great importance. Rare work has been done on milling of AISI D2 tool steel using coated tool in near past. Present study has been done to optimize the process parameters during machining of AISI D2 tool steel by CNC end milling process. Four input process parameters namely cutting speed (Cs), feed (f), width of cut (ap) and depth of cut (ae) were chosen as variables to study the process performance in terms of cutting force. The analysis of variance (ANOVA) was carried out to study the effect of input process parameters on output response. In addition mathematical models have also been developed for output response. Response surface contours were constructed for determining the optimum conditions for a required cutting force. Cutting forces have been examined by tool dynamometer. The verification experiment is carried out to check the validity of the developed model that predicted cutting force.

Keywords: End mill, Cutting force, AISI D2 tool steel, AlCrN coated tool, ANOVA, Response surface methodology;

4015

Sucrose mediated synthesis and XPS analysis of nanocrystalline $LaCrO_3$ perovskite oxide

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Abstract : $LaCrO_3$ perovskite oxide was synthesized through the solution combustion method. The sample was characterized using spectral techniques such as XRD, FTIR, DRS UV-Visible, SEM and XPS. The XRD pattern reveals $LaCrO_3$ structure with orthorhombic primitive lattices in the space group Pbnm (62) with an average crystallite size of 31 nm. The agglomeration among crystallites with irregular morphological shapes was evidenced using SEM images. La–Cr vibrations, Cr–O stretching vibrations, and O–Cr–O bending vibrations in the perovskite structure were observed from the FTIR spectrum. The Tauc' plot employing the Kubelka-Munk function obtained from UV-Visible diffused reflectance data provided the optical band gap equal to 3.64 eV. The valence states of La and Cr in the prepared $LaCrO_3$ perovskite oxide sample were appropriately identified using the binding energies obtained from deconvoluted XPS spectra.

Keywords: Perovskite, solution-combustion, agglomeration, orthorhombic, deconvoluted, etc.

4020

Characteristics Strength of M40 Concrete With Partial Replacement of Cement By Mousambi Peel Powder

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Abstract : Nowadays cement consumption has increased very much and cement production affects environment as well as it is costlier to use in large constructions. Amidst that if cement portion in concrete can be replaced by a material with similar properties, then it can be very useful for construction industry. This paper presents the findings of a research work conducted to compare the strengths of two different types of concrete. As one is M40 grade concrete and second is also M40 with partial replacement of cement with mousambi peel powder. We will find out the changes in concrete properties and try to make a good and high compressive strength concrete.

Keywords: Cement, Concrete, Compressive strength, Mousambi peel, Partial replacement

4021

Quality characteristic optimization of Aluminum Bronze in CNC by using Taguchi's approach and ANOVA

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Abstract : The purpose of this study is to look at the impacts of process parameters on surface finish and material removal rate (MRR) in order to find the best settings for these parameters. In addition, the Analysis of Variance is utilized to investigate the impact of cutting parameters on machining. Turning experiments were carried out using predetermined cutting parameters using a tungsten carbide cutting tool, according to an experiment plan based on the L9 orthogonal array. For the responses of surface roughness and material removal rate, the turning parameters were spindle speed, feed rate, and depth of cut.

Keywords: Aluminum bronze; Cutting parameters; Taguchi's approach; MRR; ANOVA;

4024

Influence of process parameters on Material addition rate and hardness of 3D Printer Material

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Abstract : The present research aims to investigate the impact of various 3D printing process settings on the Material Addition and Hardness properties of ABS polymer. Fused deposition modelling (FDM) technique was employed to fabricate the testing specimens with different process parameters namely, feed rate, infill density and layer height. The hardness of the samples was tested by Brunell hardness tester and a weighing scale was used to measure material addition. The experiments were analysed using Taguchi methodology to get the optimum parameters. The analysis of the experimental results showed the distinctive effect of the infill density and layer thickness which further discussed in the paper.

Keywords: 3D printing, FDM, Taguchi.

4027

Modelling and Analysis of Heavy Commercial Vehicle Suspension System For Fatigue Life Enhancement

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Abstract : In heavy commercial vehicles, leaf springs are linked to transfer and balance the load among the multi-axles or tandem axles. Experimental examination over fatigue life estimation of the Heavy Commercial Vehicles (HCVs) suspension system is complex, time-consuming, and costly. These requirements have led to the investigation of Finite Element Analysis (FEA) procedures and methodologies that reduces suspension system testing complexity without any curb on the quality of the suspension. A bell crank suspension system of different models of geometrical parameters combinations of rear axle suspension systems is designed and analysed to perform an effective and reliable simulation in the FEA software. In addition, their effects on the stresses and fatigue life cycles of the HCVs suspension system are studied. The primary goal is to correlate the fatigue life of leaf springs and its link to enhancing the fatigue life cycles of the entire system. The results show the optimum and enhanced suspension model consisting fatigue life ratio near unity.

Keywords: Heavy Commercial Vehicles, Bell Crank Suspension system, Finite Element Analysis, Leaf Springs.

4030

Strength Characteristics of Recycled Asphalt Pavement Aggregate based Geopolymer Concrete

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Abstract: This study presents the utilization of Reclaimed Asphalt Pavement (RAP) in geopolymer concrete. Large quantities of RAP are being dumped in landfills and will hurt the environment. Preliminary experiments were carried out to determine the effect of partial replacement of Natural Coarse Aggregate (NCA) with RAP in geopolymer concrete. The geopolymer mix was designed for M40 grade. A total of 45 cubes of size 100mm X 100mm were cast to replacecoarse aggregate by RAP for 0% (GC-0RAP), 20% (GC-20RAP), 40% (GC-40RAP), 60% (GC-60RAP), and 80% (GC-80RAP).The specimens were tested for compressive strength. A comparison of the strength values with the conventional mix shows a percentage reduction of 5.89%, 8.73%, 11.78%, and 23.17%respectively. Since GC-80RAP did not attain the target mean strength the optimum mix was fixed as GC-60RAP.

4033

A comparative analysis of exergy using dual blends of Biodiesel in a DI engine

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Abstract : The scarcity of petroleum fuels and pollution concerns has led to the search for alternate fuels. In this investigation, cottonseed and Simarouba oils are transesterified to produce the corresponding biodiesels. The esterification and transesterification were carried out in the presence of heterogeneous catalyst MgPO4. The various properties of the biodiesel are determined in the laboratory. Vateria indica is a species endemic to India that belongs to the Dipterocarpaceae family. The oil of Vateria indica is obtained by an aqueous extraction method. This oil is transesterified to obtain the biodiesel by a two-step process of esterification followed by transesterification. This biodiesel is blended with diesel in 10% and 20% volumetric proportions. The cottonseed and Simarouba biodiesels are blended in equal proportions with diesel and tested for performance and exergy analysis along with Vateria indica blends. It is found from performance and exergy analysis that biodiesel blends performed better than diesel.

Keywords: Trans-esterification; Cottonseed oil; Simarouba oil; Vateria indica oil, Blend; Biodiesel; Exergy

4034

To Study the Strength Assessment of No-Fine Concrete Pavement

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Abstract : No-fine concrete has been being used in numerous nations over a century. Its higher porosity helps in permeating precipitation water straightforwardly to ground and in this manner helps in re-energizing groundwater spring. In this review, 3 clusters of no-fine concrete each with two distinct sizes of total were ready to observe the blend that produced high compressive strength and study the impact of level of fine total on the compressive strength of no-fine concrete. The reason for this undertaking is to investigate the achievability of delivering profoundly manageable no-fine substantial blends and assessing the impact of fine total on their properties. No-fine concrete is delivered by utilizing standard Portland concrete, coarse totals, and water. This substantial is tried for its properties, for example, droop worth, porosity and compressive strength. The outcomes showed that porosity has critical impact on compressive strength of no-fine concrete.

Keywords: No-Fine Concrete; Compressive Strength; Flexural Strength; Slump Test; Cement; Aggregate; Fiber.

4036

Simulation of TAZ:Ir(ppy)3-BCP/ZnO heterostructure OLED

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Abstract : In this article, we report the temperature dependent I-V characteristics of TAZ:Ir(ppy)3-BCP/ZnO heterostructure based OLED. In addition, we have also optimized the thickness of the ETL (electron transport layer) of the designed OLED. For the optimized ETL (ZnO layer) we have simulated the I-V characteristics, Voltage Vs light flux curves and current density Vs light flux curves.

From such simulation study, it has been found that the designed OLED can work properly at the room temperature with the operating voltage ~ 4.25 V. Further, the optimized ETL thickness in the TAZ:Ir(ppy)3-BCP/ZnO heterostructure based OLED should be 50 or 60 nm for proper operation and for getting the noticeable light flux.

Keywords: ZnO; ETL; EML; LED; OLED

4037

An Exergy Analysis of Boil-off Gas Recovery Process

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Abstract : Natural gas is one of the green fuel accounted for around 22% of the total world energy consumption in the year 2004 which is even anticipated to increase by 2-3% by 2025. Research on natural gas has a long tradition. The past two decades have seen huge growth in world consumption of natural gas. It is predicted that this progress will continue to be at very fast. The important advantage of the LNG is that volume reduced to around 1/600th of its volume as gas. The density of LNG is 430 kgm^3 which is less than half of the water. This liquid phase- `LNG' is a cryogenic fluid that needs very low temperatures to stay in the same phase. With these being the pros in liquid transporting, cons include emission of gases like Boil ogases(BOG) which rapidly expand and cause over pressure in tanks. BOG needs to be recovered to minimize loss of natural gas. In this study, Claude isentropic process for BOG recovery is simulated by ASPEN Hysys software and equipment based exergy analysis is presented. Our study found that, the exergy destruction in HX1 was higher because of large temperature difference between hot stream & cold stream.

4041

Designing of Novel Nanoemulsions of Retinol Using Box Behnken Design for*psoriasis*

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Abstract : The aim of the study was to design O/W Nanoemulsion using various combination of oil, surfactants: water and drug combination using Box Behnken design model using Design Expert version 12. 3^2 factorial designs were most suited followed by 3 independent variables(A,B,C) and 7 different responses with 19 different batches. Various responses like % drug content and % *in-vitro* drug release at different time interval comparable with independent variables. Retinol acetate used as model drug for Nanoemulsion preparation for psoriasis treatment prepared by probe sonication method. During the experimentation it was found that predicted value of % drug content was 83.8421 while experimental value observed was **80.24.**Predicted values of in-vitro drug release was 5.37, 12.49, 24.37, 47.21, 69.72, 77.29 % while experimental values were 5.20±1.16, 13.46±2.71,23.90±4.06, 48.23±2.90, 67.88±6.75, **75.32±5.26** in 10, 30,60,90,120,150 mins were shown in table 4. The VIF values is 1.0-1.03 and Ri^2 range between 0-0.0327.

Keywords: Optimization, Nanoemulsion, Box-Behnken design, Psoriasis, factorial design

4042

Bioactive ExpolysaccharideFrom Marine Bacteria *Micrococcus* sp.MRN-01

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Abstract : Many more undiscovered bioactive materials /compounds from marine bacteria , the list of the isolated marine strains to date, does not reflect the diversity of forms present in the sea. Marine environment having higher sorces of natural bio-compounds or polysacharide based biomaterials which are associated with solid surfaces as biofilms. Bacterial exopolysacharides is a biomaterials which showing a growing interest especially from biofilms and extreme marine environments. The main objective of this study is to characterize the bacterial exopolysacharide (EPS) and demonstrate the biological activity profile. Optimization of the exopolysacharide production from MRN-01, higher with the growth conditions of 96 hrs of incubation, 270C , 44.9 gm/L and optimize the total carbohydrate and total protein with various parameters , more production at 96 hrs , 270C, pH 9 , ie, 128.23 gm/L, 100.26 gm/L respectively . EPS characterization by SEM, FT- IR analysis and revealed the presence of COOH, glucan, uronicacid, etc. EPS exhibit biological activities against pathogenic microbes and plant pathogenic fungi , express cyto toxicity against HELA cells and exhibiting antioxidant activity. Exopolysacharide production on steel surface influence corrosion with increased incubation .

Keywords *- EPS, Biofilm , SEM, FT- IR, Corrosion, Bioactive compound.*

4043

Effect of ionic salt on PVA/Ferric nitrate nanofibers

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Abstract : Polyvinyl alcohol/Ferric nitrate composite nano-fibers with and without addition of ionic salt of potassium chloride (KCl) are produced by using electrospinning. Ionic salt is observed to strongly influence the quality of nano-fibers. PVA/Ferric nitrate solution inabsence of KCl produced coiled nanofibers, while the addition of ionic salt of KCl to the PVA/Ferric nitrate solution resulted in straight nano-fibers. However, the collection distance between electrodes influences fiber diameter of which longer distance gives thinner and smoothnano-fibers.

Keywords: electrospinning, nano-fibers, PVA, ferric nitrate, ionic salt;

4044

Investigation of surface properties for additively manufactured SS316L parts: Effect of post-processing techniques

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Abstract : Additive manufacturing (AM) is a layer-based manufacturing process in which joining of materials is done from 3Dmodel data inlayer-by-layer fashion. AM is expanding very rapidly in aerospace, medical and automotive industries. In today's world the application of additively manufactured SS316L has grown greatly for medical implants because of its excellent corrosion resistance with good mechanical properties. The process parameter selection is major part in AM, further more, the surface and mechanical properties of a fabricated part is significant with regards to its application.SS316L additively manufactured components has encountered with several issues including high surface roughness value and low hardness value. Thus, investigation of post-processing of additively manufactured part is essential to improve the mechanical and surface properties of a part. In line with this objective, this research work aimed to investigate mechanical and surface properties of post-processed SS316L fabricated through Selective laser melting (SLM)process. The AM printed samples were post-processed by nitriding and shot peening process and used for different surface characterizations such as surface roughness, hardness and microstructure. The study is aimed to compare the effect of post-processing on the surface characteristics of AM SS316L part. The results showed improved surface roughness of shot peening part and increase in hardness of shot peening and nitride part after post-processing. The improvement in the surface roughness has been significant of around 43 % to 62 % at different energy density. The improvement in hardness is more for nitrided parts as compared to the shot peening. This study will be helpful to use additively manufactured printed post processed parts in different industries.

Keywords: Additive Manufacturing; selective laser melting; SS316L; post-processing; Shot peening, Nitriding

4045

Effect of Doping Copper on K-OMS-2 Over Soot Oxidation Activity

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Abstract : The hydrothermal approach was used to develop a sequence of copper-doped KOMS2, which was applied for soot oxidation.XRD pattern showed the tetragonal phase of KOMS2and copper-doped KOMS2.SEM analysis showed all samples showed rod-like structures. Soot TPR results revealed the copper doped KOMS2 had bulk oxygen radicals along with surface adsorbed and lattice oxygen radicals. Compared to copper-doped KOMS2 samples, KOMS2 possessed the most surface-adsorbed oxygen radicals. Using the TGA instrument, the performance of KOMS2 and copper-doped samples for soot oxidation activity was studied.KOMS2exhibited the best soot oxidation activity with$T_{50\%}$of 395 °C.

Keywords:K-OMS-2; Soot Oxidation; Copper doping; Active Oxygen radicals; Hydrothermal method; Calcination Temperature

4046

Experimental Investigations of Machining Parameters on Polyamide 6 Using Single Point Incremental Forming

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Abstract : Without the utilisation of dies or punches, the single point incremental sheet forming method includes characteristics that can adapt to a wide range of applications and needs. However, whereas if process parameters for incremental forming are not properly set, several aspects of the component formed by incremental forming might have undesirable quality. In this paper, a simulation software ABAQUS was used to perform single point incremental forming of polyamide 6 by varying parameters such as tool rotational velocity, feed rate, feed per revolution, and wall angle to investigate their influence on the thickness thinning and geometric accuracy of the formed component. With the nine combinations obtained from design of experiments, experimentation was performed using a 3-axis numerical control machine to study the different defects occurring throughout the process. A coordinate measurement machine was used to obtain the profile of the formed geometry. The geometries obtained from simulation and by performing experiments were compared. The defects such as springback effect, pillow effect, and thickness thinning were observed and discussed in this study.

Keywords: Incremental forming, Polyamide 6, plastic properties.

4047

Uniaxial Tensile Properties for Bamboo and Jute Fabric Reinforced Natural Rubber

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Abstract : Synthetic fibers were used as reinforcements for a long period of time due to their excellent properties and compatibility with natural rubbers. Tensile properties and manufacturability of natural fabrics- Jute and Bamboo are studied. Layer by layer type of composite was manufactured by compression moulding and the crosslinking of matrix and reinforcement was done by using chemlok 250 as adhesive. Properties obtained from the tests are given in this paper. Production was carried out in two stages, 1ststage was by using adhesive and the results were compared and based on these results 2nd stage of manufacturing was carried out without using adhesive. Tensile test was carried out on the basis of ASTM D412 standard. Results show that the strength of bamboo fabric as reinforcement increases the strength of material and can be used in many applications. Short fibers are always used as reinforcement in polymers for increasing their mechanical properties; one can also use the fabrics as reinforcement in different fields to increase the mechanical properties of the composites.

Keywords: Jute, Bamboo, Fabric, Natural Rubber, Tensile strength

4049

Microhardness and Wear Resistance of Alkaline Electroless Ni-P/Ni-P-ZnO Nanocomposite Platings

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Abstract : In current investigation a well synthesized zinc oxide nanoparticles (ZnO 3.5gpl, range 30 to70 nano meter, Zirox technologies) were randomly dispersed in a alkaline electroless Ni-P matrix for 1.5 hour duration and consequently Ni-P-ZnO nanocomposite platings of thickness 6-10 micron meter were deposited on mild steel substrates (grade AISI1040). A (SEM) scanning electron microscope pooled with (EDAX) energy dispersive spectroscopy and (XRD) X-ray diffraction technology was used to analyze the morphology, elemental composition, and phase structures of thesedepositions. The results of these instrumental studies explain that the electroless Ni-P matrix contains strapping ZnO nanoparticles as white globules. The as-deposited platings revealed mostly amorphous structures and while for heated platings (200^oC to 600^oC in steps of 200^oC in argon environment 99 % pure for 1 hour time) it transformed from amorphous to crystalline structures. In addition, well-developed Ni-P/Ni-P-ZnO deposits have also been tested for microhardness and wear resistance by microhardness and wear testers. The results of the micro-hardness and wear tests on well-developed Ni-P/Ni-P-ZnO platings showed that good insertion of ZnO nanoparticles into the Ni-P matrix and had a significant effect onmicrohardness and wearresistance. The phase changes of the Ni-P-ZnO nanocomposite plating at 400°C further enhanced the microhardness as well as wear resistance. The microhardness and wear resistance of the developed platings can be arranged into the following order as: Ni-P-ZnO (heated at 400°C)> Ni-P-ZnO (heated at 600°C) > Ni-P-ZnO (heated at 200°C)>Ni-P-ZnO(as-plated)> Ni-P (heated at 400°C)>Ni-P (as-plated)> MS.

Keywords: Electroless; plating; characterization; heat treatment; Ni-P-ZnO; microhardness; wear.

4050

The effect of Mg-Al substitution, particle size reduction, and thickness of $BaFe_{12-2x}Mg_xAl_xO_{19}$ samples on increasing electromagnetic wave absorption

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Abstract : The development of technology for radar absorbing materials is so rapid that absorbing materials have been created to reduce the effects of electromagnetic interference (EMI) from electronic equipment. Barium hexaferrite (BHF), an absorber material, receives much attention from scientists. Radar absorbing material based on BHF can be synthesized for high performance through substitution ion Mg and Al on Fe position in BHF, changing the thickness of the sample, and reducing particles. This research attempts to evaluate what would happen to the BHF reflection loss value if Mg-Al dopants are replacing substitution on Fe position on Barium hexaferrite, and the particle size and sample thickness are decreased. Synthesis of microwave absorbing material through mechanical alloying method followed by high power ultrasonic destruction. Mechanical alloying and high-power ultrasonic destruction are used to make a material that can absorb microwaves. Mechanical alloying is done by mixing $BaCO_3$, Fe_2O_3, Al_2O_3, and MgO Sigma Aldrich pa 99 stoichiometrically through a wet milling process for 20 hours, followed by sintering at a temperature of 1200 °C for 2 hours. The process takes 20 hours of wet milling, followed by 2 hours of sintering at 1200 °C. The Mg-Al reinforced BHF single-phase crystalline material's particle size was progressively lowered by remilling for 20 hours and ultrasonic destruction for two hours. X-Ray Diffraction (XRD), Particle Size Analyzer (PSA), Vibrating Sample Magnetometer (VSM), Vector Network Analyzer (VNA), and Scanning Electrone Mycroscopy (SEM) were used to characterize the designed materials. Mechanical alloying was used to create the single-phase $BaFe_{12-2x}Mg_xAl_xO_{19}$ (x=0; 0.3; 0.5; 0.7) material. Densification, or an increase in density, is caused by the addition of Mg-Al. Adding Mg-Al dopants to BHF does not modify its hexagonal structure, but it reduces the coercivity field and magnetic saturation and improves microwave absorption. The reflection loss value is reduced when particle size is reduced, and sample thickness is increased. At 10,80 GHz, the 2-hour sonication effect decreases the reflection loss of $BaFe_{11}Mg_{0.5}Al_{0.5}O_{19}$ with a thickness of 3 mm from -9.53 dB to -11.68 dB, resulting in an increase in microwave absorption from 87.4 % to 93.7 %. This study's best condition is $BaFe_{11.4}Mg_{0.3}Al_{0.3}O_{19}$ with uniform particle size and narrow particle size distribution, leading to a reflection loss of –17.62 dB at 8.2 and -15.43 dB at 11.64 GHz and

the ability to absorb microwaves up to 98%.

Keywords: barium hexaferrite; mechanical alloying; radar absorbing materials; reflection loss; ultrasonic destruction.

4051

Experimental Studies on Strength Behaviour of Concrete Reinforced with Natural Fibers

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Abstract : In this study, concrete with an addition of natural fibers such as sisal, jute and pineapple fibers in combinations are added to investigate the characteristics of concrete. The ratio of water to binder was set to 0.4. Combination of fibers like sisal and pineapple, pineapple and jute, and jute and sisal were added inpercentages 0.25%, 0.5% and 0.75% of volume and with lengths of 22mm and 30mm.The objective of this study was to explore if natural fibers like sisal, jute, and pineapple in combination can be used to increase structural concrete's mechanical properties such as compression strength, split tensile strength and flexural strength of fiber reinforced concrete.Concrete with a fiber combination of sisal and pineapple of 22mm length at 0.25%, has been discovered to have the better performance than other combinations of natural fibers.

Keywords:Fiber reinforced concrete;Jute fiber; Pineapple fiber, Sisal fiber.

4056

Computational Analysis of Erosion Wear in Various Angle Bent Pipes

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Abstract : Slurry Erosion Wear is a thoughtful problem that generally occurs in many major industries which handle the Multi-Phase flows for transportation through pipeline system regularly. Because of the complex nature of Multi-Phase flows, a wide range of research is happening both experimentally and computationally to analyze the conditions at different parameters. In this study, First numerical simulations were done on the experimental work of 90^0 elbow pipe geometry utilizing the Eulerian-Lagrangian strategy, two-way coupled for water and sand, Multi-Phase fluid flowing. Then standard elbow of radius ratio 1.5 of 90^0 as well as 45^0 Elbow pipe is modeled for numerical analysis. It is found that the results obtained by the DPM method were consistent with the experimental data. From the parameter analysis study, it is found that the higher velocities, concentration, and particle size effects the Erosion Wear greatly. And also found that 90^0 elbow Geometry is more prone to slurry Erosion which has to be taken care of in industries.

Keywords: Euler-Lagrangian Strategy, Discrete Phase Model, Erosion Wear, Multi-Phase Flow, Bent Pipe.;

4057

Usage of Non-metallic Fraction Recycled from Printed Circuit Board in Concrete Paver Blocks and Paver Tiles

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Abstract : Electronic waste (E-waste) management is one of the biggest challenges in India. Printed Circuit Boards (PCBs) are one of the major contributors to E-waste. PCB contains many constituents like glass fibers, epoxy resins, copper, lead, etc., broadly classified as metallic fractions (MF) and non-metallic fractions (NMF). In the management of Waste PCB (WPCB) only metallic fractions are recycled prominently since it has a high scrap value and the remaining non-metallic fractions are disposed of and not used. The possibilities of reusing or recycling non-metallic fractions are yet to be fully utilized. This research aims to compare the properties of concrete paver blocks of thickness 60 mm and concrete paver tiles of thickness 30 mm with various mix proportions to utilize NMFPCBs (Non-Metallic Fractions of Printed Circuit Boards) effectively as a partial replacement for the fine aggregate in concrete. A series of tests are conducted on paver blocks and tiles to determine the mechanical properties and durability properties such as Compressive strength, Water absorption, Abrasion resistance, Modulus of Rupture, and Breaking strength to investigate the suitability of using NMFPCBs in concrete. Concrete paver blocks and paver tiles were produced by replacing fine aggregate with 5%, 10%, 15%, and 20% of NMFPCBs. The addition of NMFPCBs can be a good substitute for fine aggregate, and therefore, can be effectively used in Paver applications.

Keywords: E-waste; NMFPCBs; mechanical properties; durability properties; paver application

4059

Assessment of Embodied Energy of Masonry Building Materials in Hassan, India

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Abstract : The construction sector is putting a lot of effort in reducing its energy, carbon, material, and water footprints, as well as taking steps toward a more sustainable built future. The building materials such as cement, aggregates, masonry units like bricks and blocks constitute to dominant percentile utilization in the construction of building. The activities involved in the production of construction materials will consume large amounts of energy. Hence time has arrived for an effective, environmental friendly, sustainable building material with judicious use of energy. It is therefore important to identify and modify the existing process of manufacture of building construction materials and compute the energy associated with manufacturing process. Production of these materials is a major cause for global warming due to release of carbon-di-oxide ($CO_{2)}$ and other gases. Hence there is a need to think, act and adopt low energy consuming, locally available building materials, reducing the transportation energy (TE) to provide alternatives which is both cost effective and environment friendly. The whole energy expenditure involved in the material manufacturing, including all upstream activities such as raw material extraction and transportation, is referred to as embodied energy (EE). This paper examines the energy efficiency of a few masonry building materials used in large quantities in the Indian construction sector. The key stages of production, consumption of excessive energy and the importance locally available raw materials are studied. The study focuses on the various stages of production and measuring the associated embodied energy of masonry building materials of Hassan. These EE figures were calculated by personal visits and survey data to industrial production plants. EE of burnt brick masonry is found to be 2.8 times the EE in comparison with AAC block masonry wall.

Keywords: Sustainable materials; Masonry materials; Energy efficiency; Embodied energy; Burning and transportation energy .

4060

Investigation of Anti-corrosion properties of TiO_2-Nanocomposites on Stainless steel

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Abstract : This research work discussed the corrosion behavior of Nano coatings on stainless steel by measuring the corrosion rate via the weight loss method. The thin film of nanocomposite was characterized by Scanning Electron Microscopy (SEM), and Fourier Transforms Infrared Spectroscopy (FTIR) from various researchers. TiO_2: ZnO: Polyamide mixture ratio (0.276:0.200:0.524) indicates the minimum weight loss in the corrosive environment (0.921), so it was selected as the optimum mixture for coatings. As a result, the plating of the nanocomposite based on thin-film technology establishes high-performance functional Nano coatings for corrosion resistance. Thus, minimize the costs of repairs due to corrosive damage, avoid service retardation and operation failure of the equipment, and save lives from injuries caused by weathered equipment and facilities.

Keywords: Nano coatings, nanocomposite, stainless steel, TiO_2, ZnO, Polyamide

4062

Photocatalytic Activity of SF-CuO-NPs Nanocomposite Material

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Abstract : The fabrication of copper oxide nanoparticles (CuO-NPs) incorporated silk fibroin (SF) nanocomposite, and the characterization and evaluation of photocatalytic activity, are the focus of this study. UV-Vis spectroscopy (UV-Vis), X-ray diffraction (XRD) measurement, and scanning electron microscopy (SEM) techniques were used to investigate the optical, structural, and surface morphological properties of SF-CuO-NPs. The UV-Vis absorption spectrum revealed the presence of CuO-NPs in the SF film, with an absorption peak at □ = 322 nm. The presence of CuO-NPs in the composite sample is confirmed by diffraction peaks found at scattering angles of 24.73°, 37.08°, 47.10°, 53.62°, 54.34°, 62.28°, 68.25°, and 74.30°. The native SF has a very smooth surface morphology, whereas the CuO-NPs included had a rough surface as shown by SEM analysis. The NPs present in the sample were spherical in shape. The photocatalytic activity of SF-CuO-NPs was further tested by observing the photo-degradation of the textile dye methylene blue (MB) when exposed to UV-B light. Within three hours, almost 91.95 % of the decolorization was observed. The findings suggested that SF-CuO-NPs could be used as a photocatalytic material in the treatment of textile waste water.

Keywords: Silkfibroin; Copper oxide nanoparticles;UV-Vis; SEM; MB degradation

4063

Preparation of polypropylene co-polymer (PPCP) based composites with improved properties in presence of MWCNT and MAgPP fillers

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Abstract : In the study, polymer nanocomposites were prepared by considering polypropylene co-polymer (PPCP) as a polymer matrix. Maleic anhydride grafted polypropylene (MAgPP) and multiwall carbon nanotubes (MWCNTs) were used as fillers to enhance the mechanical and thermal properties of the composites. In the study, the properties such as tensile strength, flexural strength, compressive strength, impact strength and thermal stability of the composites were estimated as per standard procedures. From the SEM analysis, it is noticed that MWCNTs were distributed uniformly throughout the polymer matrix. From the findings, it was also observed that the mechanical and thermal properties of the composites were improved in presence of MWCNT over the composite without MWCNT. Around 6% increment in tensile strength, 25% hike in flexural strength, 11% increase in compressive strength, and 6% improvement in Izod impact strength were obtained to the composites in presence of MWCNTs. It was further observed that around 25% increase in thermal stability up to 5% mass loss was obtained in presence of MWCNTs at a loading of 2 wt.%; whereas it was around 9% up to a mass loss of 95%. From the study, it can be concluded that the fillers played a great role in obtaining the composites with improved properties.

Keywords: Polymer composites; MWCNTs; Extrusion; Mechanical properties; Thermal Properties.

4064

Asymmetrical Interval Type-2 Fuzzy Logic Controller Based MPPT for PV System under Sudden Irradiance changes

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Abstract : Enormous researches are involved and carried out the extensive methods for photovoltaic (PV) performance enhancement since more than last decade. The surrounding environment influences the performance of the PV system. The major environmental conditions i.e. sun irradiance and temperature are required favorable to harvest higher energy. One of the most well-known fields of research is power point tracking (MPPT) approaches, which have gained a lot of attention in terms of enhancing PV performance. Researchers have proposed a variety of strategies for harvesting the most available power namelyperturb and observe (P&O) ,Incremental Conductance (INC) and soft computing-based methods, namely fuzzy logic controller (FLC),Neural networks(ANN), Adaptive Fuzzy Neural Interface (ANFIS), metaheuristics. In this work, the realistic conditions for sun irradiance such as sudden and abrupt irradiance conditions are created to investigate PV system performance for extensive analysis in terms of transient studies. For comprehensive study, an asymmetrical interval Type-2 FLC in addition to conventional P&O is being proposed for such considered realistic irradiance conditions. The performance indices such as global maximum power point (GMPP) location, transient behavior and efficiency to establish its superiority under MATLAB and Simulink.

Keywords: fuzzy logic controller; photovoltaic systems,MPPT, realistic condition

4065

Structural and Optical Properties of Copper Selenide Nanolayered Tiles

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Abstract : In this work, Cu_2Se nanolayered tiles were synthesised by a solvothermal method. The X-ray diffraction technique confirmed the cubic structure of Cu_2Se tiles. The scanning electron microscopy images show that the Cu_2Se nanoparticles are in the form of multi-layered thin nano sheets, which make tiles like morphology of dimensions of 44.08 X 29.08 X 3.77μm.The spherical grains are around 19 nm in size and are uniformly arranged on the surfaces of the multi-layered thin nanosheets. The optical properties show a direct band gap of 1.9eV, which indicates a red shift from the bulk band gap value of Cu_2Se. The reason is that the formation of tiles from the layered growth of thin nanosheets may increase the band gap of copper selenide nano-layered tiles.

Keywords: Nanosheets, solvothermal synthesis, structural properties, optical properties, bandgap.

4066

Design and Fabrication of Miniaturized DC-DC Converter on Silicon Substrate

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Abstract : An ultra-low power converter on a silicon chip requires multiple steps of design, simulation, modeling and monolithic integration of diodes, resistors, inductors, capacitors and active switching devices such as thin film transistor or Field effect transistor on a silicon substrate. Preliminary circuit level design and simulation of Buck converter circuit was carried out using the MATLAB tool. The converter was designed for a buck operation of 12 V/5 V, 500 mW rated power. Inductor and capacitor values of 1.45 mH and 0.1 µF, respectively, are required for the proposed converter. The monolithic integration on a silicon wafer requires modeling of individual components on a chip and was done using COMSOL Multiphysics. Modeled values of parallel plate capacitance and spiral planar inductance were evaluated as 611 nF and 0.1 nH, respectively. 3D Diode model with a turn ON voltage 0.7 V, and 2D MOSFET model with a threshold voltage 1.2 V has been realized using COMSOL Multiphysics. Fabrication of the power converter requires multi-step sequential process steps of individual devices using various deposition and process techniques like RF Sputtering, photolithography and etching. Shadow mask with a minimum feature size of 1 mm has been micro-machined, and a micro-inductor of 0.1 nH has been realized. Virtual hardware implementation has been done using Proteus software, with the Capacitor and Inductor values of 611 nF and 0.1 nH, respectively, and buck operation of 12 V/3.5 V, 227 mW rated power has been implemented.

Keywords: DC-DC converter, COMSOL, RF Sputtering, micro-Inductor, micro-Capacitor.

4068

CFD Simulation of Circumferential Crack In Low Pressure Water Pipelines

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Abstract : This paper describes the change in flow characteristics in a pipeline with the existence of a circumferential crack. Computational fluid dynamic (CFD) simulation of small leaks in a pipe having 138 mm diameter has been done using a 3D turbulent flow model. Three different sizes of rectangular crack are studied based on simulations using the ANSYS FLUENT 2022 Software. The steady state simulations have shown clear indications in the velocity and mass flux variations along the pipe and at the crack surface. These results show that the crack causes measurable differences in fluid flow properties at different inlet pressure. The interest of this paper is to analyse the effect of leakage on the velocity, pressure and mass flux in a 3D section of pipe. The results obtained are interpreted in the CFD Post that is included in the software package. Thus, this work intends to contribute in the development of pipe crack leakage detection in various industrial and commercial purposes.

Keywords: Pipe crack detection; Pipe crack simulation; CFD analysis of pipe crack; Circumferential leak; Water pipeline leakage

4072

Design and Modal analysis of Screw Agitator and Arm followed by Fabrication and Installation for dry mixing of ingredients to make ready-mix drinks

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Abstract: In present scenario of process equipments design and manufacturing, analysis of equipment before fabrication and installation on site plays important role. This paper presents a case study of conical vessel screw agitator designed and fabricated after the modal analysis of screw agitator and arm assembly under the required operating conditions. Mixing of ingredients is a crucial task in any process industry as the specified production batch size and batch time are key targets to be achieved. When the designing is done using theoretical formulation, its validation on the basis of FEA as structural analysis to know stress levels and deformations, modal analysis to know probable response to dynamic loading before actual fabrication is important. Further the flow analysis is also important to understand effect of operating parameters during running condition. This paper elaborates more on the findings obtained after the modal analysis of the designed screw agitator and arm assembly which is analysed with its operating speed range. Additionally, the actual conical vessel agitator screw and arm assembly installed on site is also provided.

Keywords: screw agitator, modal analysis, dry mixing, conical vessel, resonance, dry mixing

4073

Theoretical Predictions of Thermophysical Properties of BiSn Liquid Alloys at 600 K

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Abstract : Self association model has been utilized to study the concentration dependence of the thermophysical properties of BiSn liquid alloys at 600 K. In the framework of self association model, the expressions for the thermodynamic properties like thefree energy of mixing, thermodynamic activities, entropy of mixing and heat of mixing, and structural properties i.e. concentration fluctuations in the long wavelength limit and short-range order parameter have been derived. Using the experimental data of the free energy of mixing, the model parameters such as interaction energy and the ratio of the self associates have been estimated. In order to maintain the consistency, the same values of model parameters have been used to compute the thermodynamic and structural properties of BiSn liquid alloys at 600 K.The theoretical data and available experimental data show the excellent agreement. Again, Butler model in conjunction with self association model has been utilized to analyse to surface properties like surface concentration, surface tension and surface concentration fluctuations. The computed values of the surface tension of BiSn liquid alloys at 600 K are in reasonable agreement with the experimental data available in the literature. For the understanding of the mechanical behaviour of BiSn liquid alloys at 600 K, the transport properties like diffusivity and viscosity have been theoretically investigated. Moelwyn-Hughes equation has been applied to study the viscosity of BiSn liquid alloys at 600 K. The theoretical results indicate that BiSn liquid alloys at 600 K are weakly segregating in nature. The model parameters have been found to be temperature dependent.

Keywords: Gibbs free energy; Concentration-concentration partial structure factor; Short-range order parameter; Surface tension; Viscosity; Diffusivity

4074

Transition from Segregating to Ordering in AgSb Liquid Alloys at 1250 K

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Abstract : The transition from segregating to ordering in AgSb liquid alloys at 1250 K has been analyzed in the framework of quasi-lattice model. The analytical expressions have been derived for the thermodynamic and structural functions on assuming the existence of chemical complexes in the liquid alloys near the melting temperature. The theoretical values of the excess free energy of mixing, free energy of mixing, activity, entropy of mixing, heat of mixing and concentration fluctuations in the long wavelength limit for AgSb liquid alloys at 1250 K have been compared with the corresponding experimental values. The results exhibit the well agreement between the theory and experiment. The concentration dependence of heat of mixing and concentration fluctuations show the transition from segregating to ordering in AgSb liquid alloys at 1250 K. Further, the concentration dependence of the short-range order parameter and diffusivity ratio also exhibit the transition from segregating to ordering in AgSb liquid alloys at 1250 K.

Keywords: Chemical complexes; compound forming alloys; Concentration fluctuations; Short-range order parameter; Diffusivity; Segregating to ordering

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Impact on Source and Drain Position on Performance of Dual Gate Organic Thin Film Transistors

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Abstract : This paper shows the influence of different positions of source and drain in dual gate that is Top Contact, Bottom Contact, Diagonal Contact and Hanging structure on Atlas 2-D Device Tools. The influence of these different structures on different throughput such as Mobility (μ), Threshold Voltage (Vt), Subthreshold Slope and Drain current (Id) are examine. By keeping the similar structural parameters and materials, it is concluded that a Top Contact (TC) structure shows high current in contrast to the Bottom Contact (BC). The reason behind this, injection area is large for the charge particles in top contact than compare to bottom contact, which leads low contact resistance that results a high current. Diagonal Contact structure exhibits lower current than other structures due to the position of source and drain. Impact of these changes on the geomorphology of the device is extremely examined. The major current change is noted, whereas very small change in different parameters are observed.

Keywords: Top Contact, Bottom Contact, Dual Gate Organic Thin Film Transistors, Organic Semiconductors, Mobility, Subthreshold Slope Type your keywords here, separated by semicolons [maximum of 6];

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Design of UWB Antenna for Wireless Capsule Endoscopy

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Abstract : In the upcoming era, many people are affected with deadly diseases in the digestive tract, which doctors are not able to diagnosis easily. Wireless capsule endoscopy is a new, modern technique for diagnoising diseases like Crohn's disease, GI bleeding, abdominal pain, Screening for tumors, polyps, etc.., In this paper, a miniaturized ultra wideband antenna(3.1-10.6Ghz) is designed, simulated and analyzed for wireless capsule endoscopy. FR4 Epoxy is the substrate used for antenna. The antenna was simulated using the 15.0. ANSYS HFSS software and the gain of the antenna at 8.5Ghz is -23.93db. The proposed antenna has dimensions of (28.4mm x 7.75mm x 1mm) and a radiation pattern is 8.5GHz with a -10db return loss and a resonance frequency of 8.5GHz is omnidirectional. The SAR value is also in a optimum level to ensure patient safety.

Keywords – FR4 Epoxy, SAR, miniaturized, capsule endoscopy, ultrawide antenna.

4083

Structural, Optical, Photoluminescence, Magnetic and Electrochemical Supercapacitor Application of Tin oxide nanoparticles

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Abstract : In this research work, structural, thermal, morphological, optical, electrochemical and magnetic behavior probes of tetragonal tin dioxide (SnO_2) nanoparticles (NPs) were amalgamated via chemical precipitation method. The crystallinity, thermal, grain size, optical, magnetic and capacitive behaviors of the product were investigated by TG-DTA, XRD, SEM, HR-TEM, UV-Vis DRS, PL, CV and VSM studies at 700°C. The X-ray diffraction result shows the well-crystallized tetragonal structure and SEM with HR-TEM results show the spherical morphology. The broadband visible emission band is noted in the luminescence spectrum and also the predictable band gapenergy is concerning 3.94 eV. The magnetic properties were studied the high value of magnetic moment 0.7488 x 10^{-3} emu g^{-1} at RT for SnO_2NPs were displaying superparamagnetic behavior. The electrochemical performance was deliberated by cyclic voltammetry. A Specific capacitance value of 176 F g^{-1} is obtained at scan rate for a 5 mVs^{-1} in SnO_2NPs at 700°C.

Keywords: SnO_2, TG-DTA, HR-TEM, UV-DRS, PL, CV, VSM.

4084

Lithium ion battery thermal management by using coupled heat pipe and liquid cold plate

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Abstract : Operating temperature of lithium ion battery is critical factor for lifecycle, efficiency and energy storage. In electric vehicle thermal behaviour of batteries affects the overall range of vehicle. Aim of this paper is to provide a thermal management system for cylindrical batteries using heat pipe and cold plate. The heat pipe coupled with battery serves as heat transporter from battery to cold plate. The lumped parametric model based on hydro-electrical analogy was developed to verify thermal performance. Bench test setup is developed using actual cylindrical 18650 type batteries and heating elements. The results of lumped parametric model compared with actual test data. Result shows temperature drop by 6^0C and uniform distribution along the length of battery. Thus proposed design is useful for Lithium ion battery performance and life.

Keywords: battery, heat pipe, cold plate, thermal management, lithium, electric vehicle

4087

Protective Coatings on Copper Using As-Deposited Sol-Gel TiO_2 - SiO_2 Films

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Abstract : Copper has many benefits with its extensive electrical properties, but is prone to corrosion in oxide, sulphate and suphide environments. Based on our previous studies of as-deposited TiO_2-SiO_2 films which acted as protective coatings against sulphide and sulphate on silver, we extended our research onto the same films coated on copper and checked the corrosion rates using Tafel plots. The dip-coated sol-gel TiO_2-SiO_2 films reduced the corrosion rate four times compared to bare copper surface due to Ti-O-Si bonds formed in the mixed metal oxide films which enhances the adherence to the substrate, observed in the Raman spectroscopy studies.

Keywords: sol-gel-as-deposited -TiO_2-SiO_2 films-protection-copper-corrosion rate

4089

Weibull Distribution Optimization for Piping Risk Calculation Due To Uniform Corrosion Using Monte Carlo Method

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Abstract : Pipes are the main component in the oil and gas industries, which needs serious attention due to the high risk of piping system failure. The failure of the piping system leads to severe consequences since it causes substantial material losses. The Risk-Based Inspection can minimize the failure by using the Monte Carlo simulation to calculate the failure probabilities of the component. A normal distribution is generally used in Monte Carlo simulation for Random Variable Generator. However, the generated data may be biased, i.e., an error sampling, so the resulting data becomes inaccurate. In the normal distribution, the result of the data produces an overestimation data because the result of the data can be negative on the corrosion rate. Therefore, another method is needed for determining random variables where the generated data is not biased, so the accuracy of the results of the Risk-Based Inspection increases. The Weibull method can reduce the biased data generated from the normal distribution.

Keywords: pipeline, failure, Monte Carlo,Weibull,risk-based

4090

Effect of transport layer thickness in lead-based perovskite solar cell: a numerical simulation

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Abstract : This paper simulates and compares the performance of three metal oxides as electron transport layer (ETL) in planar n-i-p lead halide perovskite solar cell (PSC). By applying a 1-dimensional numerical software (SCAPS 1-D), titanium dioxide (TiO_2), zinc oxide (ZnO) and tin (IV) dioxide (SnO_2) have been opted as ETL with nickel oxyhydroxide (NiOx) as the hole transport layer (HTL). Detailed analyses are presented for fill factor (FF), open circuit voltage (V_{OC}), short circuit current (J_{SC}) and power conversion efficiency (PCE) for thickness variation of methylammonium lead iodide ($CH_3NH_3PbI_3$) or $MAPbI_3$ absorber layer. The thickness of perovskite absorber layer has been varied from 100nm-1500 nm with optimum PCE are recorded at 600 nm for all metal oxide candidates. At 80 nm thickness of both HTL and ETL, it is observed that SnO_2 produced the highest PCE value of 17.5%, followed by ZnO (17.13%) and TiO2 (16.33%). Meanwhile, the thickness of HTL and ETL have been increased up to 200 nm, which yielded a PCE reduction up to nearly 22% for all ETL candidates. Notably, this is the first ever effort that assess the effect of transport layers thickness towards the performance of lead halide PSC.

Keywords: perovskite; solar cell; electron transport layer; hole transport layer; power conversion efficiency; SCAPS 1-D

4092

Growth of Pyridinecarbothioamides and Single Crystal XRD Studies

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Abstract : A series pyridinecarbothioamides (PCT) are synthesized to produce parrot green crystals. The crystal structure of the compounds was resolved using single crystal XRD technique. It confirmed the formation of monoclinic system with different space groups depending on the position of side chains in the carbothioamide. The 3D structural arrangements show that molecules in the crystal structure are inter linked by N-H ... N or S-H … S hydrogen bonding. The compounds were also investigated by Mass spectroscopy, Thermo Gravimetric Analysis (TGA) and Nuclear Magnetic Resonance (NMR) spectroscopic techniques.

Keywords: *pyridine carbothioamides, Aromatic compounds, Characterization, Single crystal XRD,*

4095

Mechanism of Droplet Dynamics Formation in Micro-capillaries

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Abstract : The present work deals with the numerical study of droplet creation in a T-junction microchannel with a diameter of 100 µm. Here, oil (water) acts as the continuous (disperse) phase. The tracking of oil-water interface was accomplished using volume of fluid model available in the commercial software, Ansys Fluent (2021 R1). The two-dimensional computational domain was divided into ~20,800 cells to obtain a grid independent solution. While, a time step size of 10-5 – 10-6 seconds (s) ensured the convergence of the solutions. Here, we show the characteristic nature of the pressure drop at various stages of droplet formation. Moreover, the droplet size and droplet frequencies were found to decrease with the variation of velocity ratio from 1.5 to 12. Similarly, the maximum pressure at the stage of filling and necking were found to increase with the increase in velocity ratio. However, stratified flows were observe for velocity ratio = 0.5, 0.3, and 0.2. The results of the present study can be utilize towards understanding of the droplet formation and design of miniature devices with enhanced momentum, heat and mass transfer rate.

Keywords: *Microchannel, volume of fluid, pressure drop, droplet, velocity ratio*

5003

Experimental investigation of composite gypsum board integrated with phase change material for improved thermal energy storage

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Abstract : The building overheating problem is one of the most important problems facing all over the world. To overcome this problem the thermal energy storage capacity of the building elements must be increased. Therefore, this study shows indoor thermal behavior of composite gypsum board prepared through Shape Stabilized Phase Change Material (SSPCM). Lauric acid as Phase Change Material (PCM), zeolite as supporting material, graphite as thermal conductivity enhancer and gypsum as base material were used to prepare SSPCM. SSPCM-0, SSPCM-5, and SSPCM-10 were prepared using varying weight % of graphite. Four different gypsum board were prepared using SSPCM-0, SSPCM-5, SSPCM-10, and conventional gypsum powder namely G-0, G-SSPCM, G-SSPCM-5, and GSSPCM-10. To understand the morphology of the prepared composite gypsum board Scanning Electron Microscopy (SEM) images were taken. These gypsum board were then tested for indoor thermal behavior of the building by incorporating them in small cubicles on roof and on south wall. Real outdoor testing was conducted for four consecutive days. G-SSPCM shows 3.0 °C for roof and 4.54 °C for south wall in comparison with G-0. For roof maximum time delay of 200 min on day one was recorded for G-SSPCM-5 and for south wall it is 180 min by G-SSPCM-10. Integrating PCM in the gypsum board has improved the indoor temperature profile of the building.

Keywords: Phase Change Material; Temperature; Buildings; Thermal Energy Storage

5006

High capacity H_2 adsorption over Si_4Lin (n=1-3) binary clusters: A DFT study

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Abstract : This paper presents a detailed study of the hydrogen adsorption properties of small silicon-lithium binary nanoclusters. The stabilities of H_2 adsorbed binary clusters are assured by maximum hardness and minimum electrophilicity principle. Detail computational studies demonstrate that each Li in Si_4Li, Si_4Li_2 and Si_4Li_3 binary clusters can adsorb a maximum of $5H_2$, $4H_2$ and $3H_2$ molecules respectively, resulting in a total gravimetric density of 7.8%, 11.3% and 12%. The adsorption energy is observed to be in the range of 0.12eV-0.17eV, indicating that the adsorption of H_2 molecules occurs in a quasi-molecular fashion via non-covalent interaction which can easily undergo desorption at ambient thermodynamic conditions. Hence, our study concludes that the studied silicon -lithium binary clusters can be considered as potential candidates for hydrogen storage systems.

Keywords: Binary cluster; adsorption; gravimetric density; physisorption.

5007

Total Dissolved Solids (TDS) removal from sugar industry effluent using low cost adsorbents

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Abstract: : Total dissolved solids (TDS) consists of inorganic salts and organic matter in small amount those are dissolved in water. This work focusses mainly on the removal of TDS from sugar industry effluents using low cost adsorbents such as saw dust and bagasse pith. Activated carbon also used in this study for comparison purpose. The parameters studied were contact time for 30 to 120 min at an interval of 30 min., particle size (75, 125, 150 and 250 micron) and adsorbent dose (2.50, 5 and 7.50 gm.). From the studies it was observed that with increasing contact time the TDS removal is high. From the results it was found that 75 micron particle size is efficient in removing the TDS for all the adsorbents. Effect of adsorbent dose is studied for all three adsorbents. It was found that TDS is decreasing and it is found from the results that the removal of TDS is increasing with decrease in particle size.

Key words: Adsorption, TDS, low cost adsorbents, saw dust, bagasse pith, adsorbent dosage

5010

Understanding the Role of Interfacial Transition Zone in Cement Paste and Concrete

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Abstract : Concrete, a heterogeneous material, basically comprises of binder and aggregate of distinct size. Porosity levels around aggregates tend to be greater than in cement paste farther from aggregates, which might lead to a weaker cement paste-aggregate connection. Concrete characteristics are greatly influenced by the interfacial transition zone (ITZ), which accounts for 20% to 40% of the paste and is located near the particles. Microstructures surrounding embedded components such as aggregates in wet cement paste are extensively affected at the interfacial transition zone (ITZ). The ITZ has a considerable impact on the qualities of concrete, such as stiffness, strength, and permeability. Therefore, porosity in the ITZ is considered as crucial factor for determining the durability of the concrete. This review article presents the importance of the ITZ, their chemistry and microstructure, consequences of the ITZ, the effect of pozzolana in cement matrix on interfacial transition zone, and the role of temperature in establishing the C-S-H gel in the structure.

Keywords: Interfacial Transition Zone, Cement Matrix, Material Quality, Cement Hydration, Smart Materials

5011

Thermal Properties of Epoxy composites with Polyaniline and Graphene nanofiller.

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Abstract : Technological progress encourages the development of more versatile electronic devices with reduced size at an increasing rate. Thermosets epoxy is a commonly used adhesive material in the electronic packaging industry. Adhesives are capable of operating continuously at elevated temperatures and are generally used in electronics, automotive, and aerospace. It is necessary to predict the epoxy composite's life in these high-temperature applications indicating their thermal management and limitations to avoid malfunctioning. Graphene (G) and Polyaniline (PA) nanofiller with bisphenol-A resin had prepared by polymerization with different weight ratios to enhance the thermal properties of the composite materials. The heating rate effects of the synthesized composites had investigated by differential scanning calorimetry (DSC). The specific heat capacities as a function of temperature of the composites had calculated using the DSC data. Thermal conductivity, thermal stability and thermal diffusivity increase for hybrid composites with increasing filler content led to a decrease in the coefficient of thermal expansion.

Keywords: thermal properties, Graphene, Epoxy composites, polyaniline, specific heat capacity

5013

Design and Development of Magneto-Rheological Damper for Vibration Attenuation in Household Washing Machine

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Abstract : The problem of vibration in household equipment such as washing machines is a complicated one to consider. The current research work focuses on the design of MR damper, which can replace the conventional damper. In this paper, first the required damping force was calculated and then according to that, the design of the damper was carried out. The MR damper was analysed as a 2-D axisymmetric model using finite element analysis. From the finite element analysis, the optimum gap and current value were obtained. The prototype of the MR damper has been developed and tested with different current levels.For the design purpose, the properties of MR-122 EG fluid were used. The objective of the experiment was to evaluate the damping force of the MR damper. The results were compared with finite element analysis results. Finally, conclusions from the research work are given.

Keywords: MR Fluid; MR Damper; Finite Element Analysis; Washing Machine; Vibration Attenuation

5014

Dielectric relaxation studies in WO_3 mixed lead vanadate glasses

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Abstract : Lead vanadate glasses of composition, $(V_2O_5)_{0.6-x}$–$(PbO)_{0.4}$–$(WO_3)_x$, x = 0.1, 0.15, 0.20, 0.25 and 0.3 were made by melt quenching method. Their XRD patterns showed non-crystalline nature. Dielectric and impedance spectra have been investigated over the frequency range from 50Hz to 15MHz and temperature from 300K to 500K. Dielectric constant and loss varied from $3.70x10^4$ to $4.75x10^2$ and from $4.91x10^6$ to $0.15x10^{-2}$ respectively. Dielectric constant and loss showed decreasing trend with frequency and increasing trend with temperature. The cole-cole plots revealed single and semiconducting phase of the samples. DC conductivity has been derived from impedance and analysed. Activation energy for conduction is found to increase with WO_3 content. Both dielectric relaxation time and its thermal activation energy were determined from impedance and modulus, and found that they agree with each other. Master curves of electric moduli indicated that relaxation mechanism to be temperature independent in these glasses.

Keywords: Lead vanadate glasses, dielectric constant, relaxation time, impedance, modulus;

5016

Compressive Strength and Modulus of Poly (dimethylsiloxane)-Hollow Glass Microballoons Syntactic Foams reinforced with Nanoclay

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Abstract : Poly (dimethylsiloxane) is an important class of elastomers with diverse applications. However, it lacks compressive strength required in many engineering applications. The aim of this study is to enhance the compression strength and modulus of poly (dimethylsiloxane). Hollow glass microballoons, owing to its higher crushing strength compared to elastomers and significantly less density has been chosen as rigid filler to enhance the compressive properties of pure PDMS. The prepared syntactic foam is further reinforced with nanoclay (01.-1 % v/v). Introducing hollow glass microballoons in pure elastomers significantly enhance the compressive properties, especially specific compressive strength and modulus by ~191 and ~275 % respectively. Even better results are obtained with nanoclay (0.5 % v/v) as reinforcement. Improvements of the order of ~223 % and ~440 % are attained for specific compressive strength and modulus respectively. These encouraging results demand greater investigation into this newly developed composite material.

Keywords: Syntactic foam; Poly (dimethylsiloxane); Nanoclay; Composites; Compression

5018

Effect of Cooling Technique and Tool Material on TI6AL4V Alloy

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Abstract : Cutting forces during machining of Ti6Al4V under different machining conditions for different tools are investigated here. During this investigation different cooling techniques are used. Tools used were Non-coated carbide tool, TiN and $Al2\ O3$. Turning experiment was conducted for different speed, Feed and tools. By using DOE Orthogonal L9 array was created for it; Machining effectiveness was measured in the form of cutting forces and surface roughness. To find out optimum conditions the signal-to-noise (S/N) ratio, the analysis of variance (ANOVA), and regression analysis were employed under different cutting conditions. During investigation we found that Al2O3 coated insertsperform better under Cryogenic machining.

Keywords: cooling techniques, vortex jet machining, MQL,cryogenicmachining, Ti6Al4V, cutting force, SR

5019

Optimization of Machining Parameters in EDM of Inconel 625 Using Taguchi Approach

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Abstract : This paper employs Taguchi based approach for parametric optimization of electric discharge machining (EDM) with multiple performance measures. In this work, four input parameters namely peak current (I_p), pulse on time (T_{on}), pulse off time (T_{off}) andtool material, two performance measures mateial removal rate (MRR), tool wear rate (TWR), have been considered. The experiments have been designed using Taguchi's L_9 orthogonal array (OA). In order to find the best significant input parameters, the analysis of variance (ANOVA) has been employed.The work piece material considered for this study is Inconel 625 super alloy, extensively used in chemical, marine, automotive, aerospace, aviation, electronic industries and nuclear reactor. The result of the experiments shows that optimum conditions for better MRR is found for copper-tungsten electrode followed by copper tungsten for TWR in EDM of Inconel 625 super alloy.

Keywords: electrical discharge machining; surface roughness; metal removal rate; tool wear rate; overcut; taguchi optimization

5020

Enhanced Optical and Dielectric Properties of Polymer Dispersed Liquid Crystal for Display Applications

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Abstract: Polymer dispersed liquid crystal is a composite material consist of submicron sized of liquid crystals droplets in polymer matrix. The effect of different concentrations of polymer on the optical and dielectric properties of cholesteric liquid crystal has been investigated. The optical properties were investigated by polarizing optical microscopy which was confirmed by fabry perot scattering studies. The composite materials based on dispersion of polymer are important due to their improvement in electro-optical properties. Many new phase transitions in addition with the known phase transition for this composite system were investigated. The dispersion also results in the large value of dielectric anisotropy which indicates possibility of this material to be used in forming photo cured network. Our investigation shows potential applications of these materials for display applications.

Keywords- Polymer, Cholesteryl Nonanoate, Polarizing Optical Microscopy, Dielectric Spectroscopy, Fabry Perot Scattering Studies.

5021

Comparative life cycle assessment of recycled soil-stabilized bricksand traditional bricks

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Abstract : The different stakeholders are concerned about management and utilization of construction and demolition waste(CDW)resulted while construction, renovation, & devasting of structures. Excavated soil is a part of CDW and there is significant proportion of excavated soil, which is lying un-utilized or used for construction of sub-base in pavement. The excavated soil and brick waste are utilized in production of soil-stabilized bricks (SSB). In this study the SS Bare developed by using 5% cement, 50% brick waste, and 50% excavated soil. This study evaluated the environment impacts of a SSB and conventional brick by using life cycle assessment (LCA) approach as per ISO 14040. LCA was performed with SimaPro 9.3.0software.Environmental Impact classification i.e., climate change, ozone depletion, acidification & eutrophication, human-toxicity & particulate matter formation was estimated and interpreted. The incorporation of CDW in SSB resulted54% reduction in CO_2 emissions. The production of SSB would lead to sustainable use and significant saving in natural resources.

Keywords: Life Cycle Assessment (LCA), construction and demolition waste (CDW), soil stabilized brick (SSB), and brick waste

5022

Effect of Gd^{3+}doping on structural, vibrational, dielectric, and ferroelectric properties of$Bi_{0.5}Na_{0.5}TiO_3$ceramic

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Abstract : The effect of adding Gadolinium on bismuth sodium titanate ceramics on structure and electrical characteristics with the chemical formula$(Bi_{1-x}Gd_x)_{0.5}Na_{0.5}TiO_3$(x = 0.00, 0.02, 0.04, 0.06,0.08 and 0.10) (BGNT) were examined using a solid-state reaction approach.The pure perovskite rhombohedral phase is visible without any secondary phase for all of the compositions in the X-ray diffraction pattern. A comprehensive investigation of Raman spectra revealed the vibrational and phonon modes of the molecular structure. The dielectric investigation of sintered samples in temperature and frequency dependence revealed two dielectric peaks attributable to factors generated by phase transitions from ferroelectric to antiferroelectric and antiferroelectric to paraelectric. With a low remanent polarization (Pr= 0.65 μC/cm^2) and a coercive field (Ec=8.62 kV/cm), the polarisation hysteresis (P–E) loop demonstrated optimal electrical performances.

Keywords: BGNT; XRD; Raman Spectrum; Dielectric; ferroelectric

5023

Evaluation of Emission Characteristics & Performance of a Biogas-Biodiesel Dual Fuel Engine Using Blends of Butanol in Different Ratios

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Abstract : A lot of researches are being currently worldwide so as to reduce the atmospheric pollution because of the fossil fuels. One of the successful methods is to blend the oxygenated fuels & biogas with the conventional fuel which can reduce the emission of unburnt particles of CO_x, SO_x& NO_x because they the main constituents responsible for major air pollution. One such effort has been made in the current paper where the mixture of Biodiesel & butanol (5, 10, 15 & 20%) in different ratios is used as the fuel where biogas is made to flow inside a 4-stroke single cylinder compression ignition engine at different flow rates (10, 15 & 20 lpm). BTE, NO_X and CO emissions have been examined at different engine loads (10, 20, 30 & 40 N-m). Investigation reveal that B5 & B10 compositions of the blended fuel may be used in case of pure diesel fuel.

Keywords: Fossil Fuels, Oxygenated Fuels, Biogas, BTE, NO_X& CO emissions

5025

Fabrication and Characterization of Epoxy Solar Glass

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Abstract : In the current era, when the whole world has increased the consumption of renewable energy, solar power is making its place viable in urban and industrial areas. This solar power is being generated by converting sunlight into electricity through Photovoltaics (PV) which is also called as solar cells. Solar cells comprise of many parts from which tempered glass is the one whose high strength acts as a shield for the solar modules by protecting them from mechanical loads and extreme weather conditions. In this paper, a composite plate of 4mm thickness has been prepared by using clear epoxy (L4AU) and its mechanical as well as optical properties have been investigated. The result shows that its typical tensile strength values range from 2.4 to 2.6 kg/mm^2, the flexural strength lies in the range of 7.03-8.43 kg/mm^2 and its average efficiency has been found as15.14%. Variation in these properties has been found especially due to the absorption and reflection in the visible spectrum. But, looking at other aspects such as facile fabrication, cost-effectiveness and availability, the epoxy solar glass can be suggested for an alternative source in place of tempered glass in solar panels.

Keyword: solar glass, composite solar glass, epoxy composite, L4AU, solar efficiency

5029

Evaluating the Effects of Microscopes in Bipolar Intuitionistic Fuzzy Soft Expert Environment

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Abstract : This paper deals with TODIM method based on bipolar intuitionisitc fuzzy soft expert sets (BIFSES). Entropy measure on BIFSES used in calculating the weight values is developed. A score function and BIFSE normalized Euclidean distance are defined. This distance is used in computing a dominance degree matrix from which the BIFSE global values of the alternatives are calculated. The alternatives are ranked based on the global value. For different values of loss factor the global values are calculated and plotted graphically. This method is illustrated by an example.

Keywords: Bipolar intuitionistic fuzzy soft expert set; entropy measure on BIFSE;, weight values on BIFSES; global values on BIFSES

5030

Performance Evaluation of one Dimensional Electrokinetic Barrier Subjected to Saltwater Intrusion: A Laboratory Scale Study

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Abstract : Climate change is posing a serious threat to the planet and the degradation of groundwater quality is one of its aspects. Many rural areas around the world still lack access to clean drinking water. On the other hand, increase in urbanization, changes in industrial and agricultural activity, and tourism development in coastal areas have pushed the extraction of groundwater resources to their limits. One of the main issues faced by coastal community is the intrusion of saltwater into fresh groundwater aquifers due to overuse of coastal freshwater supplies. Recharge wells, grout curtains, slurry wells, and other technologies are generally used to prevent saltwater intrusion. In this direction the electrokinetic barrier can prove to be a feasible solution for preventing saltwater intrusion. The main goal of this research is to create an electrokinetic barrier that allows salt water to flow while reducing the concentration of Na+ and Cl- ions in order to achieve better quality water that meets drinking and/or irrigation standards.

This paper describes laboratory scale experimental research that was undertaken to study the efficacy of electrokinetic barrier for minimizing salt water intrusion. A one-dimensional electrokinetic barrier constructed of metal electrodes has been established to capture sodium and chloride ions. Experiments on the effect of salt concentration, voltage, electrode material, electrode spacing, and soil particle size on barrier efficiency have been conducted. Water from pumping wells from upstream and downstream of the electrokinetic barrier was tested for electrical conductivity, total dissolved solids, and pH. Electrical conductivity and total dissolved solids of pumping well samples are much greater in the control test than in the electrokinetic remediation tests. With increasing salt content and particle size, E. C. and T. D. S. values rises. The efficiency of the electrokinetic barrier increases with increasing voltage until it reaches 2.5 volts, at which point it decreases. Electrokinetic remediation works best with graphite and stainless steel electrodes. In electrokinetic remediation of saltwater intrusion, the location of the electrokinetic barrier is critical. The system must be kept at a safe distance from the saltwater source in order to function properly. Electrokinetic barrier have shown to be a sustainable method for prevention of saltwater intrusion.

Keywords: Electrokinetic Remediation, Saltwater Intrusion, One Dimensional Barrier, Sodium Chloride;

List of abbreviations: EK- Electrokinetic, EKR- Electrokientic remediation, E.C.- Electrical conductivity, T.D.S.- Total dissolved solids, Cs- Salt concentration, D100- 100% particles passing through particular sieve, Em- Electrode material, M.S.- Mild steel, Pe- Position of electrokinetic barrier from saltwater well, S.S.- Stainless steel

5031

Prospect of Near-infrared Quantum Dots in the Development of Tandem Solar Cells: Detail Charge Balance Study

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Abstract : The conventional single-junction solar cells (ex: monocrystalline silicon (cSi) and perovskite solar cells) are limited to 30% efficiency, known as the Shockley–Queisser limit. Due to operational constraints, the single-junction solar cells are transparent to a large part of the near-infrared (NIR) solar spectrum. Harvesting the unused NIR photons in tandem solar cells could be a potential way forward. However, the unavailability of suitable NIR bandgap semiconductors is a huge practical challenge in realising tandem solar cells. The advancement of nanotechnology has enabled size dependent tunability of energy bandgap of semiconductors quantum dots (QDs). It is shown here that NIR bandgap QDs can be used to augment the performance of the existing perovskite and cSi solar cells in tandem architecture. Using detailed charge balance calculation, the optimum bandgaps of QDs for the development of perovskite-QD and cSi-QD tandem solar cells have been. Further, It is also depicted that the QD solar cells can produce 11.8% and 5.2 % efficiency by using the unused transmitted photons which improve the limiting efficiency from perovskite and cSi solar cells, respectively. In tandem solar cells, this may help realise 39.8% and 34.2% efficiency in the case of perovskite-QD and cSi-QD tandem solar cells.

Keywords: Solar cell, Tandem, charge balance calculation, quantum dots, near-infrared photons

5032

Preparation of thiourea derivatives of isoniazid and evaluation of its bacterial activity

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Abstract : The research included the preparation series of Mannich base compounds Z (1-10) derived from the condensation of isoniazid and thiourea with aldehydes (formaldehyde, benzaldehyde or its substitutes) in equal molar ratios. The prepared compounds had identified using ultraviolet, infrared, proton, and carbon nuclear magnetic resonance spectroscopy. The biological activity of some of them had evaluated against *Escherichia coli*and *Staphylococcus aureus* at three concentrations (25, 50, 100 mg/ml). These compounds showed Divergent inhibition to moderate compared to isoniazid, which showed no inhibition against *Staphylococcus aureus* at a concentration of (25 mg/ml) this makes them a promising antibacterial for this type of bacteria.

***Key word**: Mannich base, Escherichia coli, Staphylococcus aureus*

5033

Peak-Shadow-Distance Method for Solar Energy Mapping of Al-Hajar Mountains Using Data Mining Techniques

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Abstract : The Sultanate of Oman, being the founding member of the six-nation Gulf Cooperation Council (GCC) countries of Southwest Asia, is bounded by two sides' water and the other sides by land. Oman is abundant with natural energy resources. The sources of renewable energy are free as well as cost effective to extract the energy. During natural calamities like cyclones, the Al Hajar Mountains are under power outage which results in villages being isolated in the dark for long periods. In addition to that, the undulation of the mountains is a burden to connect such villages from a common grid. Satellite images are used to identify the villages and to map the suitable location for the generation of renewable energy. Based on the environmental criteria, it is observed that the extraction of solar energy is optimal at these locations to fulfill the energy needs. In this paper, an attempt has been made to propose Peak-Shadow-Distance method for solar energy mapping to fulfill the stand-alone energy requirements of such villages. In addition to that, the demographic area and the environmental criteria are considered for suitable spatial sites selection using unsupervised data mining methods. By using this method, the similarities between the topology of the location to install the solar PV panels has been identified. Some sites are good to fix the panels but the demographic criteria may not be suitable. So, the environment plays a vital role in the site selection. The site selection will be useful to install solar panels for electrification of schools, colleges and small-scale industries, commercial buildings, selected residential areas and stakeholders.

Keywords: Renewable Energy, Solar Energy, Peak-Shadow-Distance Method, Unsupervised Clustering, K-Means, K-Medoids, Data Mining

5034

Facile Synthesis and characterization of ZnSe nanoparticles

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Abstract : In this work ZnSe nanoparticles (NPs) have been synthesised by simple Co-precipitation method using hydrazine hydrate and Ethylenediamine. The structural, morphological and optical properties of as-synthesized sample have been investigated using X-rays diffraction (XRD), transmission electron microscope (TEM), and UV-Visible and Photoluminescence (PL) spectroscopy techniques. The XRD results revealed the formation of hexagonal structure of as-synthesized ZnSe NPs which were elongated to the reflection (101).TEM micrographs confirmed the formation of nanoparticles with average particle size around 20 to 30 nm. UV–visible absorption spectroscopy shows 2.88 eV band gap which is the blue shift from its bulk band gap (2.7 eV) of ZnSe. The PL spectra and corresponding CIE diagram predicted the as-synthesized NPs emitted green colour and found suitable for formation of green LEDs and Lasers.

Keywords: *Co-precipitation method, Nanoparticles, Chromaticity, Zinc Selenide, Green emission, LED etc.*

5039

Performance evaluation of diesel engine with electroless nickel plating on piston skirt

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Abstract : The heat engine is a device, it coverts the chemical energy of a fuel into heat energy. The produced heat energy can be utilized for useful works in Industries, Automotives, Agriculture and power production applications. In Internal Combustion engines combustion is a important phenomena to developing the heat energy from the engine cylinder. Due to corrosion, wear and tear of the inside cylinder on the piston, not effectively heat energy is released from the engine. So, that exhaust emissions are released increases from the engine. The piston skirt is coated with Electroless Nickel plating, it improves the combustion rate and efficiency of the engine. The performance results shows that reduces the NOx and PM emissions, heat losses and improve the brake power, corrosion resistance of the piston.

Keywords: Piston skirt, Electro less coating, corrosion resistance and heat energy

5041

Stereochemical investigation of a diversely significant crystalline material

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Abstract : 1-Methyl-2,4-bis(2-ethoxyphenyl)-3-azabicyclo[3.3.1]nonan-9-one (1-Me_*o*-OEt ABN) is a Mannich base, synthesized by an easiest and modified tandem condensations of 2-methylcyclohexanone, 2-ethoxybenzaldehyde and ammonium acetate. X-Ray diffraction quality single crystals were flourished by deliberate evaporation from ethanol. The empirical formula of the molecule is $C_{25}H_{31}NO_3$ and the crystal belongs tomonoclinic system ($\alpha = \gamma = 90°$, $\beta = 100.866$) with P2(1)/n space group. The crystalline material exists in a twin-chair conformation with an equatorial orientation of the 2-ethoxyphenyl groups. Both the piperidine and cyclohexane rings are puckered with a total puckering amplitude Q_T of 0.594 and 0.551 Å, respectively. The 2-ethoxyphenyl groups are attached on the either sides of the secondary amino group at an angle of 29.66° to each other.

Keywords: Azabicycle; Crystalline material; Crystal study; Single crystal XRD; Stereochemistry

5048

Methyl Esters of *Vitis Vinifera* Seed Oil and Al_2O_3 Nano additives impact on DI Diesel Engine Performance and Emissions

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Abstract : This work investigates the impact of Methyl Esters of *VitisVinifera* Seed Oil (MEVVSO) and Al_2O_3 Nano additives on DI diesel engine performance and emissions. The Methyl Esters are produced from *VitisVinifera* Seed Oil (VVSO) through transesterification process. The fuel blends of MEVVSO20, MEVVSO20+Al_2O_3 (10ppm), MEVVSO20+Al_2O_3 (20ppm) and MEVVSO20+Al_2O_3 (30ppm) are prepared and tested in DI diesel engine. The addition of Al_2O_3nano additives into the MEVVSO20 fuel blend improves the performance of the engine. At full load condition of the engine the Brake Thermal Efficiency (BTE) is improved by 5.87%, 7%, and 8.48% respectively for MEVVSO20+Al_2O_3 (10ppm), MEVVSO20+Al_2O_3 (20ppm) and MEVVSO20+Al_2O_3 (30ppm) in comparison with MEVVSO20. Further, there is a reduction in Carbon monoxide (CO), Hydrocarbon(HC) and NOx emissions are observed for nano additive mixed fuel blends.

Keywords: Methyl ester; Nano additives; Diesel Engine; Performance and Emissions

5050

Electronic properties of Ferrocene / Graphene interface on ferromagnetic surface and pyrolytic graphite

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Abstract : The strong correlation among molecular elecronic structure and physical properties of tailored nanostructures makes thorough understanding of molecule-substrate intractions crucial for the development of functional molecular devices. In this context, we investigate the electronic structure of the ferroecene interface with carbon based materials, graphene on ferromagnetic Ni(111) substrate and HOPG. Fe $L_{2,3}$ analysis indicates no signigicant chargre transfer from Ni(111) to the iron ion and ferrocene alsmost desorbs completely due to weaker interaction with underlying transition metal substrate passivated by intermediate graphene layer. C K edge analysis indicates that ferrocene intercalates into HOPG forming interlayer states between adjacent sp^2 hybridized layers. Moreover, ferrocene molecules do not desorb at room temperature on HOPG in contrast to Gr/Ni(111) probably due to captive environment provided by layered HOPG structure and π-π interactions. The study can have notble implications towards the potential applications of graphene or graphite in combination with transition metal ferromagnets as spin filter devices.

Keywords: Electronic structure, molecule-substrate interactions, charge transfer,ferrocene molecules.

5051

Advances in hybrid junction solar cells

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Abstract : Fabrication of highly efficient and low cost solar cells is the thrust area in material science. A wide variety of materials have been explored in order to improve the efficiency and thermal stability of solar cells. Hybrid organic-inorganic solar cells incorporate advantages of both organic as well as inorganic materials in order to improve charge carrier mobility and light absorption over a wider electromagnetic spectrum. This review article focuses on hybrid organic-inorganic solar cells fabricated using ZnO and TiO_2 nanostructured materials and discusses the issues related to power conversion efficiency, heterojunction interfaces and thermal stability. ZnO has been found to be efficient electron transport layer material significantly improving the solar cell efficiency. ZnO inherent defects states have been mitigated by utilizing a ZnO based composite film with molybdenum disulfide and resulted in significant improvement of electron transport and fill factor. Doping of TiO_2 thin films with metallic dopants such as silver and cobalt has been found to improve the conductivity of TiO_2 thin films, thereby an improvement in solar cell efficiency has been observed. Further, TiO_2 nanoparticles have been incorporated into the perovskite films and resulted in improvement of light absorption and stability of perovskite films.

Keywords: organic-inorganic solar cells, heterojunction interfaces, fill factor, nanostructured materials, solar cell efficiency.

5055

Effect of Areca Fibers on Early Strength of Hybrid Fiber Reinforced Concrete

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Abstract : The 'Areca' is a hard, fibrous substance that covers the endosperm and accounts for 60-80% of the areca fruit's overall weight and volume. Natural fibres have the potential to be employed as reinforcement in cement and concrete matrices to help overcome some of the problems that come with these materials these materials' shortcomings. These fibres have advantages over commonly used fibres. Artificial fibres are preferred because they are less expensive, renewable, non-abrasive, abundant, and do not produce pollution, difficulties with health and safety during handling, processing, and mixing procedures on the other hand, by combining artificial fibres with great strength and light weight. Natural fibres may aid in achieving the desired qualities for concrete, allowing it to be used.

The M30 grade of concrete was produced in this investigation by adding areca fibre(AF) and steel fiber(SF) as a reinforcement. 0%AF+0%SF, 0.5%AF+0%SF, 0.5%AF+0.5%SF, 0.5%AF+1%SF, 0.5%AF+1.5%SF, 0.5%AF+2%SF, 0.5%AF+2.5%SF, 1%AF+2%SF, 1.5%AF+2%SF and 2%AF+2%SFare the percentages. To investigate and assess the differences in workability of fresh concrete, specimens with increasing AF,SF and compressive strength, split tensile strength, and flexural strength dose of areca fibre at various curing times.

Keywords: HybridFiber reinforced concrete; composite; areca fibers; natural fibers.

5057

Electrochemical Quantification of Vanillin Using Hydrazine Derivative Modified Pencil Graphite Electrode

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Abstract : Herein this report, a disposable electrochemical sensor was developed by modifying pencil graphite electrode by 2,4-dinitrophenylhydrazine (DNPH) using electropolymerisation technique for the detection of Vanillin or 4-Hydroxy-3-methoxybenzaldehyde. Electrochemical estimation of Vanillin was donewith the help of Cyclic Voltammetry and Differential pulse voltammetric techniques. The morphological characteristics were studied using SEM analysis. A single oxidation peak was obtained for Vanillin at the potential of +0.5214V. The adapted electrode exhibits a linear range of 1µM - 900µM with LOD of 0.34µM. The PDNPH/PG electrode was then used for real sample quantification and it manifested RSD value less than 5% which revealed that the developed sensor is a favorable tool for quantification of Van. This is the first time reporting Vanillin determination by using a modified pencil graphite electrode as working electrode in supporting electrolyte PBS 7.

Key Words: Vanillin; Electropolymerisation; 2,4-dinitrophenylhydrazine; pencil graphite electrode; Voltammetry.

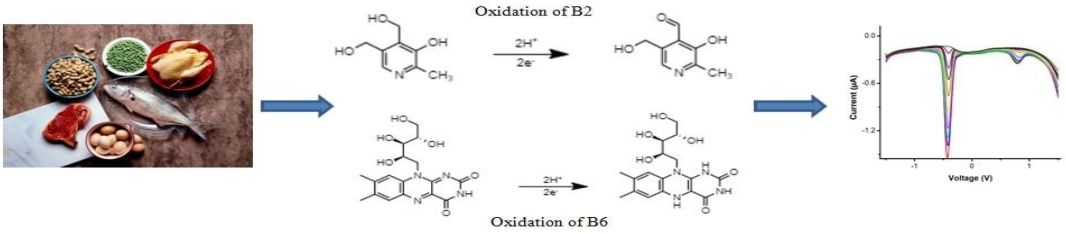
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Poly-5-Amino-1-naphthol modified pencil graphite electrode for the simultaneous electrochemical determination of Pyridoxine and Riboflavin

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Abstract: Reporting an electrochemical sensor based on electropolymerized pencil graphite electrode (PGE), modified using 5-Amino-1-naphthol as monomer (PANT/PGE) for parallel determination of vitamins Pyridoxine and Riboflavin. The morphological and electrochemical characterizations were done using SEM analysis, Cyclic Voltammetry and EIS. The oxidation peaks of VB6 and VB2 are obtained using Differential Pulse Voltammetry. The linear ranges obtained for VB6 and VB2 are10 to 100µM, 100 to 700µM with LOD of 0.7687µM and 20 to 100µM, 100 to 400µM with LOD of 0.1535µM respectively. Thus, this novel fabricated electrode can be employed for pharmaceutical studies.



Keywords : Pyridoxine; Riboflavin; 5-Amino-1-Naphthol; Electrochemical Sensor; Pencil Graphite Electrode

5060

Innovative Design and Analysis of Plough for Vineyards

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Abstract : Plough design development has been on the table for millennia, there is still room for improvement. This paper is an attempt to build and analyze a plough for a grape farm's complex terrain. Ploughing, which splits the top layer of soil, and mechanical weed elimination are two of the most basic tasks performed by farmers. Traditional plough designs were inefficient in covering complex regions, especially in grape vineyards. This paper details the design of a plough mounted on a 24/28 HP farming tractor. The primary goal of the design is to cover difficult areas in grape farms, which are generally gaps between two successive plants that aren't tilled by traditional plough designs. The optimized design is capable of Ploughing and weeding in complex areas of the farm by using a flexible plough arm on both sides working on an innovative mechanism thus providing aeration to the roots and being cost-efficient.

Keywords: Plough, Vineyard, Innovation, Design, FEA, Agriculture

5072

Microstructure Evolution and Strength Development for Pozzolana Blended Cement Mortar

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Abstract : Replacement/Blending of cement with pozzolanic materials to reduce clinker content and analyzing its influence on resulting microstructure and strength development is an attempt in enhancing concrete sustainability. Present study compares microstructure development amongst pozzolanic materials with that of reference sample and monitors the process of microstructure evolution. Pozzolanic materials with two different replacement levels (namely 10% and 30 %) based on its surface area have been considered. Mortar samples for all considered pozzolanic materials following constant water binder ratio have been studied. Microstructure evolution of the sample is monitored through usage of optical microscope with the pixel resolution of 17.3μm. The observed images have been analysed through image processing tools to understand distribution of intensities, observed shift during evolution process and its comparison with control sample. The intensity distribution observed in histogram is further compared with line histogram of an image with identifiable features. Intensity values corresponding with white deposits in the sample are compared to be associated with Calcium Hydroxide (*CH*). Adopting threshold values over histogram at different time instants, estimates are drawn for presence of calcium hydroxide in the sample. As pozzolanic characteristics of the material is associated with consumption of *CH*, the evolutionary trend of this estimates is compared and is correlated to develop pozzolanic index. It measures transition of supplementary materials from filler to pozzolanic. Further, strength development at 28 and 56 days for both control samples and those with pozzolanic material have been compared and its variation correlated with pozzolanic index developed.

Keywords: Supplementary materials, Pozzolanic behaviour, Calcium hydroxide, Optical imaging, microstructure analysis

5073

The Influence of Water-Gypsum Ratio on the Properties of National Gypsum (Joss) for Various Additives

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Abstract : In this study, an attempt has been made to investigate the influence of three additives, namely; "Tree Glue Powder (ŦGP)", "Polyvinyl Acetate (PVA)", and "Silica Fume (SF)", on some of "National Gypsum (Joss)" properties, namely; "Setting Time" and "Compressive Strength". Moreover, the effect of changing "Water-Joss" ratio (W/J) on the aforementioned properties with and without the presence of each of the aforementioned additives individually, have also been studied. For this objective, eight mixtures have been made, they were classified into two main groups in accordance with their (W/J) ratio (0.4 or 0.3), each of which was further classified into four mixtures, each of them containing one of the three aforementioned additives as well as the fourth reference mix that is free of them. The selected weighted contents of these additives were; (0.4% for ŦGP), (4.0% for PVA) and (0.6% for SF). It was found that, the compressive strength of (Joss) have magnified when SF was added, but it is decreased when ŦGP was added. As for the setting time of (Joss), it is decreased when SF was added, but it is considerably increased when ŦGP was added. Research results have also revealed that when the ratio of (W/J) is increased from (0.3) to (0.4), the good effect (i.e. the percentage of increasing) resulted from adding (SF) on the compressive strength and from the addition of (ŦGP) on the setting time of (Joss) enlarged, while the bad effect (i.e. the percentage of decreasing) induced by adding (SF) on the setting time and by the addition of (ŦGP) on the compressive strength was reduced.

Keywords : Tree Glue Powder (ŦGP), Polyvinyl Acetate (PVA), Silica Fume (SF), Setting Time, Compressive Strength, Water-Joss ratio (W/J).

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Learning Based Motion Planning of a 6-DOF Manipulator by using a Neural Network

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Abstract : A learning-based Path planning of a 6-DOF robotics manipulator is presented in this research paper. The proposed learning method employs an extensive manipulator path dataset. The Manipulator path dataset consists of time parameterized trajectories of the manipulator's joint angles that move the end effector from its home position to a specified final position and orientation in the robot workspace. The information stored in the manipulator path dataset is learned using a stochastic gradient algorithm using a feed-forward neural networks(NNs). After successful training, the NNs could accurately predict the manipulator's joints angle trajectory. The proposed technique can be used for intelligent trajectory planning of 6-DOF manipulators in 3D space for various manufacturing-related tasks. The numerical simulations validate the proposed method.

Keywords: 6-DOF Manipulator, Neural network,3D Trajectoryplanning of manipulator

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Historical Water body changes using Spatio temporal Indices- A case study of Dakshina Kannada

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Abstract : The spatiotemporal shift of surface water affects the structure, performance, and development of the ecosystem in Dakshina Kannada as well as its agricultural, economic, and social development. In order to better recognize the long-standing variations in the surface water area in Dakshina Kannada, the study used all available Landsat images (7534 scenes), the modified Normalized Difference Water Index (MNDWI), the Enhanced Vegetation Index (EVI), and the Normalized Difference Vegetation Index (NDVI) to map the open-surface water from 2014 to 2020 in the Google Earth Engine (GEE) cloud platform. The study looked at precipitation, temperature, and irrigated land to see how weather variation and anthropologicalactions affect long-standing surface water changes. The following are the outcomes. (1) The Dakshina Kannada, the extreme, periodic, and yearly average water body area values have all decreased during the last 8 years. In the meantime, the number of extreme, periodic, and lasting water bodies has been steadily increasing. (2) The maximum water body area influences the variance of surface water area in the Dakshina Kannada, whereas the number of minimum water bodies influences the variation of water body number. (3)The area and number of water bodies are statistically significantly improved by rainfall, which also significantly improves water body area and number. Each algorithm's performance was evaluated and verified using a ground survey. The city's water surface area has changed significantly during the last 8 years, according to this study.

Keywords: *Ecosystem; Google earth engine; Landsat Images; Surface water; Landsat Image*

5079

Effects of Al^{3+} concentration on the structural, dielectric and conductivity properties of Al-doped ZnO

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Abstract : Al substituted zinc oxide (ZnO) nanostructures with general formula $Zn_{1-x}Al_xO$ (x=0.0, 0.01, 0.03, 0.05, 0.07, 0.09 and 0.10) were prepared by a simple and low-cost wet chemical precipitation technique. The structure and morphology of the prepared samples were investigated by X-ray diffraction (XRD), Fourier Transform Infrared (FTIR) and scanning electron microscopy (SEM). A single crystalline phase characteristic of ZnO with a wurtzite structure was detected for all synthesized oxides. With increasing dopant content, the average crystallite size of the nanostructures was reduced. The results of dielectric measurement indicate that the parameters k and tan δ were decreasing with the rise in frequency; the Dielectric constant (k) was found to increase with the increase in Al concentration. The electrical conductivity of Al-doped ZnO samples increased in comparison with that of pure ZnO due to the increase of available charge carriers after the replacement of Zn ions by Al ions.

Keywords: Nanostructures; Coprecipitation; Dielectric constant; Dielectric loss; Electrical conductivity;

5080

Experimental Investigation of Sustainable Suburban Revamp in Anna Nagar Locality

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Abstract: The experimental proposal of sustainable residential apartments for suburban areas. The best way to predict the way is to design it. Sustainable buildings are helping to reduce environment impacts. This is accomplished by the efficient use of water, energy, and other resources which includes reusing the waste water, reducing, efficient use of resources. The renewable energy created on the building is partially compensated by the total resources used in the apartment. With the increase in water and electricity demand, adopting self-sustaining methods for the production of energy and clean water greatly reduces the need of energy by efficiency profits thereby meeting energy needs by implementing renewable technologies. So it's time to adopt a sustainable energy policy that puts consumers, the environment and peace first.

Keywords: Sustainable buildings, renewable energy, efficient use of energy, reusing of waste water, self-sustaining.

5086

Characteristics of Ni-P-CNF Electroless Nanocomposite Platings

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Abstract : In latest pioneering work, the electroless Ni-P/Ni-P-CNF nanocomposite depositions have been plated productively upon fundamental mild steel substrate (grade AISI1040). The 2.5 gpl well activated carbon nano fibers (CNFs) of the range 30-180 nm were indiscriminately dispersed in an acidic electroless Ni-P matrix seeing that a subsequent phase substance for 2 hour duration and were abridged by a reducing driving force named whilst sodium hypophosphite. The nanocomposite platings depth was found in between 10 to 13 µm range. After depositions, the as-plated Ni-P-CNF electroless depositions were heated at 200°C and 400°C in Argon ambiance for 60 minute duration and in addition that it was also analyzed through SEM, XRD and EDAX techniques. The fallout of these instrumental studies explicate that the electroless Ni-P matrix contains low immensity stipulation of CNF particles as long white tubes and gobbets. The as-plated platings revealed mostly amorphous structure and whereas heated platings (200°C to 400°C in steps of 200°C in argon 99 % for 1 hour) are transformed from amorphous to crystalline structures. The stability and quality of Ni-P-CNF nanocomposite depositions is found to be less effective.

Keywords: Electroless; Nanocomposite; CNF; Nanoparticle; Plating; Microscopy

5088

Study of modeling of cyclohexanol and polystyrene polymer solution at $T = 453.15K$ and $T = 493.15K$ using UNIFAC-FV

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Abstract : This work evaluates the potential of the group contribution method universal functional activity coefficients-free volume (UNIFAC-FV) to predict vapour-liquid equilibria (VLE) in cyclohexanol ($CH,CH_{2,}OH$) and polystyrene ($CH_{2,}ACH,AC-CH$).The results of the calculations are in a good agreement with experiment. The absolute average deviations (AADs) between theory and experiment for the polymer solution i.e., cyclohexanol in polysterne (M_w=200,000 g/mol) at T=453.5 and T=493.15 are found to be 0.012 and 0, respectively for weight fraction activity coefficients and 0.024 and 0.007, respectively for activity or activities coefficients.

Keywords*: UNIFAC-FV, Cyclohexanol, Polystyrene, Group contribution method, Absolute average deviations*

5090

Synthesis and intense visible emission of Er^{3+}/Yb^{3+} ions codoped lithium tellurite glasses under UV and IR excitation

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Abstract : The tellutite glasses doped Rare-Earth (RE) oxide with optimum composition of (70-x) TeO_2-15Li_2O_3-15WO_3–xEr_2O_3 –2Yb_2O_3 (TWLEYO) glasses were synthesized using conventional technique for their optical properties in photonics. Visible emission of blue, green and red emission of TWLEYO glass doped with 2mol% of Er^{3+} ions pumps at 380nm has been investigated. Further weak blue emission of 462nm and 495nm and intense upconversion for green and red emission of TWLEYO glass excitation around 800 nm has been also measured .Upconversion enhancement of RE fluoride based TWL glass in regime corresponding to two pump wavelengths (800nm) based on excited -state absorption and energy-transfer is investigated .From the Excitation mechanism of upconversion emission intensities indicates that a two –photon excited state absorption is responsible for the green emission while a non-resonant energy transfer performs the red emission of $^4F_{9/2} \rightarrow {}^4I_{15/2}$ transition. Also the room temperature green fluorescence decay from Yb^{3+} /Er^{3+} ions in TWLEYO sample under 488nm excitation pulse duration at rate < 10ns was measured and analyzed.

Keywords: Visible emission, Photoluminescence; Tellurite glasses, Er^{3+} -Yb^{3+} ions,Up conversion.

5092

Structural Performance of Hybrid Fibres incorporated Re-Cycled Aggregate RC Slab

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Abstract : Concrete is a material that mainly consists of coarse aggregate and mortar. The forming of cracks is an existing problem in Reinforced Concrete (RC) slab. In this research, hybrid fibres namely steel and polypropylene fibres in suitable combinations are identified and incorporated to concrete to regulate the formation and development of cracks in RC slabs. In Hybrid Fibre Reinforced Concrete (HFRC), 1 per cent of steel fibre and 0.30 per cent of polypropylene fibre is added, which is the effective amount of reinforced concrete added based on information obtained from the various research studies. In addition, now-a-day use of Re-Cycled Aggregate (RCA) is strongly recommended to address the lack of traditional coarse aggregate. By using RCA as a partial substitution of coarse aggregate with an inclusion of 1% of steel fibre and 0.30% of polypropylene fibre to the concrete volume in the study, a typical approach is recommended. One-way type of RC slab, 1350 mm x 500 mm x 100 mm in dimension, is cast and tested in the laboratory in compliance with the Indian standard code IS 456: 2000 [1]. The compressive strength of concrete, load carrying capacity, load versus deformation characteristics, stiffness and ductility relationship properties of the RC slabs was compared and discussed between control specimens and 0 to 50 percent of partially substituted RCA specimens.

Keywords: Hybrid Fibre Reinforced Concrete, Steel Fibres, Polypropylene Fibres, Re-Cycled Aggregate, RC Slab

2027

Development of Mn-Mo-X-Y-Z-O Based Electrocatalytic Materials for Making Hydrogen Fuel from Saline Water

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Abstract : The efficacy of W, Sn, and Sb additions in Mn-Mo-O-based electrocatalysts explore their catalytic properties of oxygen evolution effectiveness, stability, and durability for hydrogen-energy production from saline water electrolysis. The Mn-Mo-X-Y-Z-O (X=W;Y=Sn;Z=Sb) electrocatalysts were electrodeposited on the Ir-Sn-Sb-O/Ti (TMO) electrode utilizing a current density (CD) of 600 A/m^2 at 90 °C. The composition, phase, and surface morphology of these electrodeposited catalysts were investigated using X-ray photoelectron spectroscopy (XPS), X-ray diffraction (XRD), and confocal scanning laser microscopy (CSLM) techniques. The catalytic properties of the materials were studied using iodometrically and galvanostatic polarization methods in saline solution with 3% NaCl in acidic (pH 1) conditions at room temperature (25 °C). Three sets of nano-phase Mn-Mo-X-Y-Z-O electrocatalysts are fabricated first time, which play significant roles in the production of sufficient amounts of hydrogen from saline water electrolysis. The fabricated electrocatalysts show nearly 100% (i.e., 99.6-99.8%) oxygen evolution efficiency (OEE) after the electrolysis of aqueous 3% NaCl solution (pH 1; 25 °C) at 1000 $A.m^{-2}$ CD for more than five months. The W, Sn, and Sb additions show the beneficial effects on the Mn-Mo-O-based catalysts to maintain high electron-conducting power and the OEE activities for a long time.

Keywords: Hydrogen-fuel energy; MnO_2 based-catalyst; Saline water electrolysis; Stability; Iodometry

2059

Eugenol-Based Molecular Imprinted Membrane Synthesis as a Glucose Sensor in Honey

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Abstract : Diabetes Mellitus (DM) occurs when there is a lack of insulin in the body so that it cannot transfer glucose into cells, causing blood sugar (glucose) not to be converted into glycogen. As a result, blood glucose levels rise. Indonesia is a country that has various types of plants, one of which is cloves which contain 80-90% eugenol. Eugenol is an organic compound having three functional groups, namely allyl, hydroxy, and methoxy groups, which are very selectively used as electrode mixture materials. EMIM offers a sensor technology that is selective for glucose. EMIM is more effective and selective for glucose than ENIM. The results obtained by sensors and selectivity of EMIM in honey and honey of the archipelago are influenced by pore size, porosity, hydrophilicity, Nernst factor, detection limit, response time, and glucose selectivity using EMIM is better than ENIM.

Keywords: MIM; Polyeugenol; Glucose Sensor; Selective; Honey

2062

Hydrothermal Synthesis of ZnO Nanostructures for Room Temperature CO Gas Sensing Analysis

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Abstract : A ZnO nanostructure was successfully synthesized via a facile and efficient hydrothermal method. The sample was characterized by XRD, SEM, UV-vis and Photoluminescence (PL) techniques. The XRD pattern revealed that the sample was wellcrystallized in a hexagonal wurtzite structure. SEM images showed that the as-prepared ZnO exhibited a rods like nanostructure, which was self-assembled by thin and uniform nanorods with a thickness of approximately 30 nm. UV-vis spectra showed that a significant blue-shift in the absorption edge for the as-prepared ZnO as compared to the commercial ZnO. PL spectra indicated that the concentration of surface oxygen vacancies in the asprepared ZnO was much higher than that of the commercial ZnO. Furthermore, the nanorod assembled ZnO nanostructure exhibited excellent gas sensing properties towards CO, indicating that the as-prepared ZnO architecture is a promising material for gas sensors.

Keywords: Hydrothermal synthesis, CO sensing, ZnO, VOC

3012

Sound Radiation of a GLARE Panel at Elevated Temperature

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Abstract : In this work, the effect of nodal and anti-nodal shifts on the sound radiation pattern of a uniformly heated square baffled GLARE panel is analyzed. The panel is examined with a 1N harmonic force at the center and offset locations under elevated temperature using the finite element method. The effect of load location and temperature on sound radiation pattern is computed using Rayleigh integral method. It is observed that the panel's natural frequencies reduce with an increase in temperature and changes in sound radiation pattern due to modes nodal and anti-nodal shift.

Keywords: GLARE, Finite Element Method, Thermal Load, Thermal Buckling, Rayleigh Integral and Sound Radiation.

3040

Multiphysics Simulation and Analysis of MEMS-based Chevron shaped Electro-Thermal Actuator for Quad-way Switching Application

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Abstract : This investigation presents a novel MEMS Quad Electro-Thermal Actuator design for switching applications that focuses primarily on the design, optimization, and device modelling of a four-way switching bent-beam actuator using COMSOL Multiphysics simulation platform. The structure is energized by providing potential to bent beams anchored at both ends, Joule heating causes thermal expansion in the beams, and the apex advances due to the beams' pre-shape in the form of an offset angle. The overall device dimensions fall in 5mm×5mm. A one-way actuator with seven pairs of chevrons configured bent-beams bridged by a moving shuttle topology, results in a total translational stroke parallel to the substrate was found to be 41.8 microns at a potential 5V with an ambient temperature of 20°C.

Keywords: MEMS; Electro-Thermal Actuator; Bent-Beam;

3054

Study of Tribological Properties of Al6061 Hybrid Nano Composites

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Abstract : Sliding wear behaviour of aluminium alloy reinforced with nano alumina (nano Al_2O_3) and molybdenum Disulfide was studied. The different proportions of Al6061 composites are pure Al6061, Al6061 with 5 wt % nano Al_2O_3 and Al6061 with 5 wt % nano Al_2O_3 and 5 wt % MoS_2.The composite specimens were prepared using stir casting technique. Material, load, sliding speed and sliding distance were the process parameters used for this study. The experiments were conducted in a pin on disc apparatus. Taguchi design of experiments and ANOVA were employed to investigate the influence of process parameters on wear rate. Worn surfaces of Al6061 hybrid nano composites were analyzed and type of wear was observed using scanning electron microscope images.

Keywords: Nano Alumina, Molybdenum De Sulphide, Taguchi, ANOVA, Scanning Electron Microscope

3056

Effect of Various Pattern Stitching on Mechanical Properties of Jute Fibre Reinforced Composite

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Abstract : Natural fibre composites are seen as a more eco-friendly and cost-effective materials alternative to synthetic composites. However, they suffer poor interfacial and mechanical properties at critical situations due to its weak fibre orientation and weak fibre-matrix interface. This study investigates the mechanical behaviour of stitched jute fibre reinforced composite matrix. The composite was made by hand layup method with 40% of jute fibre into epoxy matrix. The jute fibres stitched by various stitching patterns like square, tilt 45/45, double column stitch and densely Rectangular stitch. The stitch was made in nylon thread. The results show that the double column stitch composite matrix attained a maximum strength against all mechanical behaviour tests.

Keywords; natural fibre, jute, epoxy, composite matrix, stitching,

3060

Monitoring hydration of concrete using EMI of surface bonded smart piezo patches

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Abstract : Smart materials possessing piezoelectric characteristics are nowadays utilized by researchers as an emerging material for monitoring health of the structures. As concrete one of mostly used building material, its real-time prognosis from its plastic states to the hardened states and even to its complete life span, is become easier, economical and time-saving while utilizing lead zirconate titanate (PZT) patches and Electro-mechanical impedance (EMI) technique. In this paper, a numerical study has been demonstrated for assessing concrete health at different days of its hydration states, after developing and analyzing the finite element (FE) models of concrete cube of 150x150x150mm3 with adhesively bonded PZT patch on its surface. High frequency excitations were imposed to PZT patch to capture the EMI response of the substrate in form of conductance and susceptance signatures. The development in strength or say its health gain with modified substrate characteristics upon hydration is quantified statistically in term of root mean square deviation (RMSD) index. The validation of experimental outputs from literature has been carried out with a high accuracy, followed with demonstrating the parametric study to judge the EMI signatures variation with changing properties of the concrete substrate on hydration. The mathematical regression models are also proposed for relating the RMSD variations with concrete properties. The PZT patch enabled EMI outputs for developed FE model founds in providing higher performance for real-time monitoring problems that will be helpful for engineers and researchers for estimating concrete hydration at any instance in its life span.

Keywords: PZT patches; Electro-mechanical impedance (EMI) technique; finite element modeling; structural health monitoring.

3068

Experimental Investigation on Thermal Performance of Pulsating Heat Pipe by Using Dowtherm – A

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Abstract : Many new promising ideas and technologies were introduced into thermal management with the rapid growth of electronic technology, one of which is the pulsating Heat Pipe (PHP)

Which is different from traditional heat new transfer method. PHPS are heat transfer devices that do not required the use require the use of a pump or additional Power to work. To operate, a pump or additional Power Required. They also don't need a wicking structure to move the fluid and can handle larger heat fluxes. Pulsating flow of liquid sluges and vapour

Plugs is triggered by the period variations of vapour in the evaporator and condenser during heating. Natural oscillations of the intermediate working fluid between the Evaporator and condenser during heating. Natural oscillations of the intermediate working fluids between the evaporator condenser section during heating. Natural Oscillations of the intermediate working fluid between the evaporator and condenser sections induce convection and phase change. Pulsating Heat Pipes perform typical heat pipes in terms of performance and can be utilized to tackle future electronic cooling issues. the pulsating heat pipes is made up of Eight turns copper tubes with an internal diameter of 2mm,a thickness of 0.5mm and a total length of 5320mm.the experiment is carried out with changing filling ratios of 45%,55%,65%,75% and 85% of its volume for different working fluids Dowtherm-A.the heat input is adjustable from120W to 600W in120W increment of step size. thermal resistance is 0.09738^0C /W ^{0}C/W, heat transfer coefficient is 738.68W W/m^2 ^{0}C and hence exhibits good enactment at a filling percentage of 65%.

Keywords*: Pulsating Heat Pipe, Filling Ratio, Heat input, Dowtherm-A.*

4008

Preparation and Characterization of Graphene Oxide Nanoparticles Derived from Wheat Straw

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Abstract : This research prepared graphene oxide (WSGO: B3) using the modified Hummer method using vegetable raw materials and wheat straw stalks. The prepared nanocomposites were diagnosed by physical processes such as melting point as well as spectroscopic methods such as Infrared Spectra (FT-IR), Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM) and diffraction X-ray. It was found that there are apparent differences in the number of layers in nanoparticles. A low value indicates the presence of cavities within the nanoparticles. The increase in the number of layers between nanocomposites, and from this, it was found that the relationship is not always direct between the grain size peaks D and the number of layers nor the distances between them d. This is due to the difference in the compositions of additives to the plates.

Keywords: Nanoparticles; Graphene oxide nanoparticles; Wheat straw; Hummer method

4035

Synthesis and characterization of some mixed ligands complexes of β-enaminone with some metal ions

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Abstract : The study include the perpetration and characterization of new ligand of β-enaminone with their mixed ligands complexes of first transition element ions which their formula are [(M)(L1)(8.h.q)]; M= [Co(II), Ni(II), Cu(II), Zn(II) and Cd(II)]. The prepared ligand and its complexes were diagnosed by the (FT-IR) furrier transform infrared spectroscopy, IR (Infrared spectroscopy), (Uv-vis) ultraviolete–visible) spectroscopy. (1H, 13C-NMR Neuclearmagnatic spectroscopy or Resonanse), mass spectroscopy, melting point , thin film chromatography on thinlyer chromato Graphy, the (pH) measurement , and (CHNS) analysis. The results prove that the ligand behave as bidentate chelating through the exocyclic oxygen and nitrogen atoms.

Keywords: Complexes; hydroxy quinoline; enaminone; first transition elements.

1043

Impact of Recycled Aggregates on Mechanical Properties of Concrete

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Abstract : The voluminous disposal of demolition waste into landfills is proving to be an owing cause of environmental pollution. An essential outlook for economic construction is the processing of the waste procured from construction works to preserve an ecological balance. To contribute towards research to generate sustainable reusable construction products, an attempt was made to analyze the feasibility of recycled coarse aggregates (RCA) as a substitute for coarse aggregate. An experiment has been conducted to develop sustainable concrete grade M30 conforming to Indian Standards. The partial replacement was carried out using C&D waste extracted from the nearby dump yard in the vicinity of Ahmedabad city and processed at a nearby recycling plant. A total of 5 batches were produced with a 10% increment of RCA. The physical properties of traditional and processed aggregates were compared. A comparative analysis between the hardened properties of the control mix and recycled aggregate concrete (RAC) was performed. Test parameters determined to study the impact of recycled aggregate were compressive strength, flexural strength, and split tensile strength. It was observed that the specific gravity and water absorption of recycled aggregates (R.A.) were lower and higher, respectively, in contrast to natural coarse aggregate. The results prove that the performance of concrete containing recycled constituents was largely affected by the properties and quality of aggregate and deviates slightly towards the lower end of the desired level but reduces the environmental impact of disposal.

Keywords: Recycled Coarse Aggregate; Recycled Aggregate Concrete; water absorption; specific gravity; C & D waste

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