3.4.5 Citation Index

The following are the bibliometric of the publications for the academic year 2018-19 based on average Citation index in Scopus and Web of Science.

Table 1: Citation Index for Publication in Scopus

S.No	Title of the paper	Name of the Authors	Title of the Journal	Year of the Publication	Citation Index
1.	Architecture for Interactive Internet of Things to Estimate Optimal Mean Temperature with Multiphase in Crop Insurance Payout System	Mangani K.P., Kousalya R.	Proceedings of the 3rd International Conference on I-SMAC IoT in Social, Mobile, Analytics and Cloud, I-SMAC 2019	2019	0
2.	Spectroscopic (Ft-ir, ft-raman), first order hyperpolarizability, nbo and homo-lumo analysis of z)-3-(2,4-dichlorophenyl)1-(1h-imidazol-1-yl)prop-2-en-1-one	Arulappan S., Raj Muhamed R., Ishaqahamed A., Karunathan R., Prabha D., Krishnaveni S.	International Journal of Scientific and Technology Research	2019	0

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3.	Silicon confers protective effect against ginseng root rot by regulating sugar efflux into apoplast	Abbai R., Kim Y.-J., Mohanan P., El-Agamy Farh M., Mathiyalagan R., Yang D.-U., Rangaraj S., Venkatachalam R.	Scientific Reports	2019	4
4.	Stabilization of tetragonal zirconia in alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites: A comparative structural analysis	Karthik A., Srither S.R., Dhineshbabu N.R., Lenin N., Arunmetha S., Manivasakan P., Rajendran V.	Materials Characterization	2019	3
5.	A sensitive refining of in vitro and in vivo toxicological behavior of green synthesized ZnO nanoparticles from the shells of Jatropha curcas for multifunctional biomaterials development	Suriyaprabha R., Balu K.S., Karthik S., Prabhu M., Rajendran V., Aicher W.K., Maaza M.	Ecotoxicology and Environmental Safety	2019	10
6.	Cross domain opinion mining using maximum entropy based classifier	Manimekalai V., Rohini S.G.	Journal of Physics: Conference Series	2019	1

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7.	Review on template matching and registration of retina images for teleophthalmology	Sivaranjani B., Kalaiselvi C.	International Journal of Scientific and Technology Research	2019	0
8.	Influence of nanoflower FeTiO3 in carbon dioxide reduction	Palanisamy S., Srinivasan S., Shyma A.P., Rajendhran N., Subramani K., Murugan V., Venkatachalam R.	SN Applied Sciences	2019	4
9.	Reconnaissance artificial bee colony routing protocol to detect dynamic link failure in wireless sensor network	Nithyanandh S., Jaiganesh V.	International Journal of Scientific and Technology Research	2019	0
10	Multiclass data imbalance oversampling techniques (Mudiot) and random selection of features	Shobana V., Nandhini K.	International Journal of Innovative Technology and Exploring Engineering	2019	1

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11	Missing value aware optimal feature selection method for efficient big data mining process	Meera S., Rosiline Jeetha B.	International Journal of Recent Technology and Engineering	2019	1
12	Review of scheduling methodologies of virtual machines (Vms) in heterogeneous cloud computing	Rekha S., Kalaiselvi C.	International Journal of Scientific and Technology Research	2019	0
13	Designing weather based crop insurance payout estimation based on agro-meteorological data using machine learning techniques	Mangani K.P., Kousalya R.	International Journal of Recent Technology and Engineering	2019	1
14	Euler movement firefly algorithm and fuzzy kernel support vector machine classifier for keystroke authentication	Rathi M., Senthil Kumar A.V.	International Journal of Innovative Technology and Exploring Engineering	2019	2

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15	Water-dispersible graphene–wrapped MnO2 nanospheres and their applications in coin cell supercapacitors	Palanisamy S., Shyma A.P., Srinivasan S., Rajendran N., Venkatachalam R.	Ionics	2019	3
16	Adaptive particle swarm optimization based credentialed extreme learning machine classifier (APSO-CELMC) for high dimensional datasets	Praveena M., Jaiganesh V.	International Journal of Innovative Technology and Exploring Engineering	2019	0
17	Enhanced Photovoltaic Performance of Hybrid Solar Cells with a Calcium Interfacial Metal Electrode	Vinoth M., Surendhiran S., Senthilmurugan P.R., Rajendran V.	Journal of Electronic Materials	2019	2
18	Predicting academic performance of tertiary students using classification algorithm	Jayaprakash S., Jaiganesh V.	International Journal of Recent Technology and Engineering	2019	0
19	Round trip latency based authentication scheme in fog-enabled cloud computing system	Nagarani C., Kousalya R.	International Journal of Recent Technology and Engineering	2019	2
20	Dynamic link failure detection using robust virus swarm routing protocol in wireless sensor network	Nithyanandh S., Jaiganesh V.	International Journal of Recent Technology and Engineering	2019	0

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21	Groundnut shell -a beneficial bio-waste	Duc P.A., Dharanipriya P., Velmurugan B.K., Shanmugavadivu M.	Biocatalysis and Agricultural Biotechnology	2019	22
22	Explosives properties of high energetic trinitrophenyl nitramide molecules: A DFT and AIM analysis	Anbu V., Vijayalakshmi K.A., Karunathan R., Stephen A.D., Nidhin P.V.	Arabian Journal of Chemistry	2019	12
23	Growth, vibrational, optical, thermal, magnetic and dielectric behavior of organo-metallic tetramethylammonium cadmium chloride crystal	Bhuvaneswari N., Priyadharsini N., Sivakumar S., Venkatachalam K., Siva V.	Journal of Thermal Analysis and Calorimetry	2019	12
24	MACppred: A support vector machine-based meta-predictor for identification of anticancer peptides	Boopathi V., Subramaniyam S., Malik A., Lee G., Manavalan B., Yang D.-C.	International Journal of Molecular Sciences	2019	67
25	Novel modified nano-activated carbon and its influence on the metal–O_2 battery system	Palanisamy S., Shyma A.P., Srinivasan S., Venkatachalam R.	Journal of Energy Storage	2019	4

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26	Enhanced discharge capacity of Mg-air battery with addition of water dispersible nano MoS 2 sheet in MgCl 2 electrolyte	Prabhakaran Shyma A., Palanisamy S., Rajendhran N., Venkatachalam R.	Ionics	2019	3
27	Pharmalogical activities of antroquinonol- Mini review	Angamuthu V., Shanmugavadivu M., Nagarajan G., Velmurugan B.K.	Chemico- Biological Interactions	2019	17
28	Passive and Active Control on 3D Convective Flow of Viscoelastic Nanofluid With Heat Generation and Convective Heating	Eswaramoorthi S., Bhuvaneswari M.	Frontiers in Mechanical Engineering	2019	3
29	Antimicrobial efficacy of fresh and dried banana peel extracts: An in vitro study	Kavitha V., Manonmani G., Devakumar J.	Drug Invention Today	2019	2
30	Efficient feature extraction and sparse reduction using enhanced bat optimization with support vector machine algorithm for facial expression recognition	Dinesh Kumar P., Rosiline Jeetha B.	Journal of Advanced Research in Dynamical and Control Systems	2019	0

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31	Optimized random forest techniques to improve the resource allocation scheme in cognitive radio networks	Kannan M., Jeetha B.R.	Journal of Advanced Research in Dynamical and Control Systems	2019	0
32	Numerical study on the effect of angle of inclination on magnetoconvection inside enclosure with heat generating solid body	Umadevi P., Nithyadevi N., Oztop H.F.	Journal of the Indian Mathematical Society	2019	0
33	Routine correspondence method with grey wolf optimization based imperforate support vector machine classifier (ISVMC) for high dimensional datasets	Praveena M., Jaiganesh V.	Journal of Advanced Research in Dynamical and Control Systems	2019	0
34	CCHS: An improved centralized cluster head selection in wireless sensor networks	Kowsalya R., Rosiline Jeetha B.	Journal of Advanced Research in Dynamical and Control Systems	2019	0
35	Antioxidant potential and antitumour activities of Nendran banana peels in breast cancer cell line	Kumar P.S., Durgadevi S., Saravanan A., Uma S.	Indian Journal of Pharmaceutical Sciences	2019	7

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36	Cross-diffusion effects on MHD mixed convection over a stretching surface in a porous medium with chemical reaction and convective condition	Bhuvaneswari M., Eswaramoorthi S., Sivasankaran S., Hussein A.K.	Engineering Transactions	2019	13
37	Biological investigations of ruthenium(Iii) 3-(benzothiazol-2-liminomethyl)-phenol schiff base complexes bearing PPH 3 / asph 3 coligand	Subbaiyan S., Ponnusamy I.	Current Chemistry Letters	2019	3
38	Cross diffusion effects on MHD convection of casson-williamson fluid over a stretching surface with radiation and chemical reaction	Bhuvaneswari M., Sivasankaran S., Niranjan H., Eswaramoorthi S.	Trends in Mathematics	2019	3
39	A mixture of iodide ion and gum exudates of eucalyptus globules as green inhibitor for dissolution control of mild steel in 1 N HCl medium	Dheenadhayalan S., Roja R., Nijarubini V., Mallika J.	Asian Journal of Chemistry	2019	0

| 40 | Effects of viscous dissipation and convective heating on convection flow of a second-grade liquid over a stretching surface: An analytical and numerical study | Bhuvaneswari M., Eswaramoorthi S., Sivasankaran S., Rajan S., Saleh Alshomrani A. | Scientia Iranica | 2019 | 15 |

Table 2: Citation Index for Publication in Web of Index

S.No	Title of the paper	Name of the Authors	Title of the Journal	Year of the Publication	Citation Index
1.	Two Phase Content Based Image Retrieval with relevance ranking on classified images	Sindu, S.; Kousalya, R.	2019 international conference on computer communication and informatics	2019	0
2.	Explosives properties of high energetic trinitrophenyl nitramide molecules: A DFT and AIM analysis	Anbu, V.; Vijayalakshmi, K. A.; Karunathan, R.; Stephen, A. David; Nidhin, P. V.	Arabian journal of chemistry	2019	11

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3.	Enhanced discharge capacity of Mg-air battery with addition of water dispersible nano MoS2 sheet in MgCl2 electrolyte	Shyma, Arunkumar Prabhakaran; Palanisamy, Siva; Rajendhran, Naveenkumar; Venkatachalam, Rajendran	Ionics	2019	3
4.	Novel modified nano-activated carbon and its influence on the metal-O-2 battery system	Palanisamy, Siva; Shyma, Arunkumar Prabhakaran; Srinivasan, Venkatachalam, Rajendran	Journal Of Energy Storage	2019	2
5.	Enhanced Photovoltaic Performance of Hybrid Solar Cells with a Calcium Interfacial Metal Electrode	Vinoth, Murugan; Surendhiran, Srinivasan; Senthilmurugan, Pemman Rathinam; Rajendran, Venkatachalam	Journal of electronic materials	2019	2
6.	Water-dispersible graphene-wrapped MnO2 nanospheres and their applications in coin cell supercapacitors	Paianisamy, Siva; Shyma, Arunkumar Prabhakaran; Srinivasan, Surendhiran; Rajendran, Naveen Kumar; Venkatachalam, Rajendran	Ionics	2019	3

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7.	Influence of nanoflower FeTiO3 in carbon dioxide reduction	Palanisamy, Siva; Srinivasan, Surendhiran; Shyma, Arunkumar Prabhakaran; Rajendhran, Naveenkumar; Subramani, Karthik; Murugan, Vinoth; Venkatachalam, Rajendran	Sn applied sciences	2019	2
8.	Passive and Active Control on 3D Convective Flow of Viscoelastic Nanofluid With Heat Generation and Convective Heating	Eswaramoorthi, S.; Bhuvaneswari, M.	Frontiers in mechanical engineering-switzerland	2019	2
9.	Antioxidant Potential and Antitumour Activities of Nendran Banana Peels in Breast Cancer Cell Line	Kumar, P. S.; Durgadevi, S.; Saravanan, A.; Uma, S.	Indian journal of pharmaceutical sciences	2019	3
10	Groundnut shell -a beneficial bio-waste	Pham Anh Duc; Dharanipriya, P.; Velmurugan, Bharath Kumar; Shanmugavadivu, M.	Biocatalysis and agricultural biotechnology	2019	24
11	Stabilization of tetragonal zirconia in alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites: A comparative structural analysis	Karthik, A.; Srither, S. R.; Dhineshbabu, N. R.; Lenin, N.; Arunmetha, S.; Manivasakan, P.; Rajendran, V.	Materials characterization	2019	3

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12	A sensitive refining of in vitro and in vivo toxicological behavior of green synthesized ZnO nanoparticles from the shells of Jatropha curcas for multifunctional biomaterials development	Suriyaprabha, R.; Balu, K. S.; Karthik, S.; Prabhu, M.; Rajendran, V; Aicher, Wilhelm K.; Maaza, Malik	Ecotoxicology and environmental safety	2019	10
13	Pharmacological activities of antroquinonol - Mini review	Angamuthu, Venkatachalam; Shanmugavadivu, M.; Nagarajan, G.; Velmurugan, Bharath Kumar	Chemico-biological interactions	2019	16
14	Silicon confers protective effect against ginseng root rot by regulating sugar efflux into apoplast	Abbai, Ragavendran; Kim, Yu-Jin; Farh, Mohamed El- Dong-Uk; Rangaraj, Suriyaprabha; Venkatachalam, Rajendran;	Scientific reports	2019	3
15	mACPpred: A Support Vector Machine-Based Meta-Predictor for Identification of Anticancer Peptides	Boopathi, Vinothini; Subramaniyam, Sathiyamoorthy; Malik, Adeel; Lee, Gwang; Manavalan, Balachandran; Yang, Deok-Chun	International Journal Of Molecular Sciences	2019	70

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Criterion III Metric 3.4.5

| 16 | Preparation of Polyethylene Glycol-Ginsenoside Rh1 and Rh2 Conjugates and Their Efficacy against Lung Cancer and Inflammation | Mathiyalagan, Ramya; Wang, Chao; Kim, Yeon Ju; Castro-Aceituno, Veronica; Jimenez-Perez, Zuly Elizabeth; Yang, Deok Chun; Jung, Seok-Kyu | MOLECULES | 2019 | 8 |

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Publications in Scopus for Academic Year 2018-19

Architecture for Interactive Internet of Things to Estimate Optimal Mean Temperature with Multiphase in Crop Insurance Payout System

Publisher: IEEE   Cite This   PDF

K.P. Mangani ; R. Kousalya   All Authors

Abstract

Document Sections

I. Introduction

II. Related Works

III. Applying IoT in Weather Index Insurance

IV. IoT Framework for Weather Index Insurance

V. Proposed Mwtcbknn-Payrule

Abstract:
The Proposed Architecture investigates the Interactive Internet of Things (IOT) Technique in Estimating the optimal mean temperature for five agricultural locations in Tamilnadu. The experimented data arises from the climatic data, sensor data, historic data and satellite data that are collected through IoT data Sources and monitored by runtime monitoring services. Those data are analyzed and processed by an Automated Mean value of Multiphase of Temperature. It is done with the Time series Analysis to find the optimal Mean temperature for multiple phases (fifteen to thirty days seasonal period of Daily Temperature). This research paper proposes the model MWTCBKNN (Multiphase Weighted Temperature Class based K-nearest neighbor) for effective classification of temperature zones based on optimal mean temperature and the mean rise in temperature with respect to threshold factors. The PAYRULE (Payout Rule) model is also designed for the prediction of crop insurance payout value based on MWTCBKNN classified data for five districts of Tamilnadu. For the proposed model MWTCBKNN-PAYRULE, the results are adequate as it is assumed that optimal mean temperature captured for specific region has done by IOT Data Sources with Time series analysis.

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Spectroscopic (FT-IR, FT-Raman), first order hyperpolarizability, NBO and HOMO-LUMO analysis of Z)-3-(2,4-dichlorophenyl)1-(1H-imidazol-1-yl)prop-2-en-1-one

S. Arulappan, R.RajMuhamed, A. IshaqAhamed, R.Karunathan, D.Prabha, S.Krishnaveni

Abstract: The Fourier Transform Infrared (FT-IR) and FT-Raman Spectra of ((Z)-3-(2,4-dichlorophenyl)-1-(1H-imidazol-1-yl)prop-2-en-1-one (1) have been recorded in the regions 4000-100 and 4000-450cm^{-1}, respectively. A complete assignment and analysis of the fundamental vibrational modes of the molecule were carried out. The observed fundamental modes have been compared with the harmonic vibrational frequencies computed using DFT (B3LYP) method by employing 6-311++G(d,p) basis sets. The vibrational studies were interpreted in terms of potential energy distribution. The first order hyperpolarizability (β_0) and related properties (α, μ and $\Delta\alpha$) of this molecular system were calculated using B3LYP/6-311++G(d,p) method based on the finite-field approach. Stability of the molecule arising from hyperconjugative interactions and charge delocalization have been analyzed using natural bond orbital (NBO) analysis.. Molecular electrostatic potential (MEP) and HOMO-LUMO energy levels were also constructed.

Index Terms: DFT, FT-IR, FT-Raman, HOMO-LUMO, MEP, NLO.

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1. INTRODUCTION

Imidazole derivatives have attracted significant interest in recent time for their usefulness in synthetic heterocyclic chemistry, analytical and pharmacology. They are a highly polar and have a calculated dipole moment of 3.61D. It is 5- membered nitrogen containing heterocyclic ring, which are soluble in both organic and inorganic polar solvents. They are amphoteric in nature and aromatic in character due to the presence of 6 -electrons.The nitrogen attached with the hydrogen has a lone pair of electrons bringing the required 6 -electrons for aromaticity. The hydrogen atom can be located on either of the two nitrogen atoms due to resonance structures of imidazole [1]. A literature survey of imidazole derivatives show that they posses antimicrobial, anti-inflammatory, analgesic, anti-tubercular and anticancer activities. Further possible improvements in their activity can be achieved by slight modifications in the substituent on the basic imidazole nucleus. By virtue of having structural similarity with histidine, imidazole compound can bind with protein molecules with ease when compared to the some other heterocyclic moieties

membranes, without interference with sterols and sterol esters. Recently various new drugs developed using imidazoles derivatives have shown better effect and less toxicity.

2. Synthesis of (Z)-3-(2,4-dichlorophenyl)1-(1H-imidazol-1-yl)prop-2-en-1-one

A mixture of N-acetyl imidazole (0.01mmol) and 2,4-dicholorobenzaldehyde(0.01mmol) was dissolved in 20 ml of ethanol, cooled to 5 -10 °C in an ice bath. A cold aqueous sodium hydroxide solution (10 ml, 10%, wt/v) was added drop wise to the reaction mixture under stirring and after the addition, the stirring was continued for 6 h under ice-cold condition. A flocculent precipitate formed in the process was filtered, washed with cold water, and recrystallized from ethanol. The components of the reaction mixture were analyzed by TLC and the product was separated from a silica column.

REPORTS

OPEN

Silicon confers protective effect against ginseng root rot by regulating sugar efflux into apoplast

Ragavendran Abbai[1], Yu-Jin Kim[2], Padmanaban Mohanan[1], Mohamed El-Agamy Farh[1], Ramya Mathiyalagan[1], Dong-Uk Yang[2], Suriyaprabha Rangaraj[3], Rajendran Venkatachalam[3,4], Yeon-Ju Kim[2*] & Deok-Chun Yang[1,2*]

Root rot caused by *Ilyonectria mors-panacis* is a devastating fungal disease leading to defect in root quality and causes reduced yield during the perennial life cycle of *Panax ginseng* Meyer. This indicates the imperative need to understand the molecular basis of disease development and also to enhance tolerance against the fungus. With this idea, the protective effect of silicon (supplied as silica nanoparticles) in *P. ginseng* root rot pathosystem and its molecular mechanism was investigated in the current study. We have tested different concentrations of silicon (Si) to disease-infected ginseng and found that long term analysis (30 dpi) displayed a striking 50% reduction in disease severity index upon the treatment of Si. Expectedly, Si had no direct degradative effect against the pathogen. Instead, in infected roots it resulted in reduced expression of *PgSWEET* leading to regulated sugar efflux into apoplast and enhanced tolerance against *I. mors-panacis*. In addition, under diseased condition, both protopanaxadiol (PPD) and protopanaxatriol (PPT) type ginsenoside profile in roots were higher in Si treated plants. This is the first report indicating the protective role of Si in ginseng-root rot pathosystem, thereby uncovering novel features of ginseng mineral physiology and at the same time, enabling its usage to overcome root rot.

Panax ginseng Meyer is an Oriental medicinal adaptogen and ginsenosides are the major pharmacologically active components of ginseng, which is proved to be effective against various diseases[1]. It is perennial in nature and the transition from vegetative to reproductive phase occurs at the third year and the accumulation of ginsenosides in roots increases with age[2]. Ginseng root rot caused by the fungus, *Ilyonectria mors-panacis* is one of the devastating diseases which initially infects the root tip and then proceeds until the crown. In addition, replanting results in infection of new plants. Hence, there is an imperative need to design strategies to overcome ginseng root rot. Younger age (~2 years) of the plant, acidic soil (pH 5.5–6.0), soil temperature (18–20 °C), high iron content are the major factors that promote the occurrence of root rot[3,4].

Pathogen invades a plant to acquire nutrients which are majorly sugars, to support their growth and replication[5]. Understanding the molecular signaling events during plant-pathogen interaction is of great importance to establish strategies to overcome the pathogen. The plant defense system initially detects the pathogen, followed by the activation of the appropriate signal cascades. The downstream defense responses especially the crucial role of hormonal pathways such as SA (Salicylic acid), JA (Jasmonic acid) and Ethylene (ET) mediated pathways are well established. Periodic global transcriptome analyses by RNAseq revealed that JA and ET are majorly activated

Stabilization of tetragonal zirconia in alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites: A comparative structural analysis

A. Karthik[a], S.R. Srither[a], N.R. Dhineshbabu[a], N. Lenin[a], S. Arunmetha[a], P. Manivasakan[a], V. Rajendran[a,b,*]

[a] Centre for Nano Science and Technology, K. S. Rangasamy College of Technology, Tiruchengode, 637 215, Tamil Nadu, India
[b] Centre for Research, Dr. N G P Arts and Science College, Coimbatore, 641048, Tamil Nadu, India

ARTICLE INFO

Keywords:
Al_2O_3-ZrO_2
Al_2O_3-$(Y_2O_3)ZrO_2$
Nanocomposites
Solid state solubility
Crystalline size effect
Electron microscopy
Elastic properties

ABSTRACT

Mass production of alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites powder was prepared from nitrate precursors using an automated hot-air spray pyrolysis technique. The microstructural characteristics of nanocomposites were comprehensively analyzed. X-ray diffraction patterns showed that completely a tetragonal-zirconia phase was stabilized in the nanocomposites at elevated temperature. The average crystallite size for the corresponding nanocomposites powder was measured respectively in the range of 6-65 and 10-47 nm. The produced large quantity of nanopowder was discovered as controlled particle size (d_{50}) of 30 nm, spherical shape, and free flowing structure had a surface area of 61 m^2g^{-1}. Further, their structural phase identification and its transformation were correlated through thermal analyzer and diffraction pattern. The interpretation for an increase in hardness and decrease in elastic modulus values of nanocomposites was witnessed at a wide range of calcination. Finally, the t-ZrO_2 toughened nanocomposites was retained their overall specific properties and same will be more viable for various industrial applications.

1. Introduction

Multiphase nanocomposites have attracted in interdisciplinary research area due to the existence of exotic properties that are different from their bulk materials. The properties of nanomaterials are depending purely on parameters such as particle size, shape, and structural phase and its homogeneity [1-7]. In recent years, the preparation of metal oxide nanocomposites in both amorphous and crystalline nature is fascinated towards the various multidisciplinary requirements [8-10]. Thus, the multiphase nanoceramics are extensively used as a coating material in problem-oriented upper-surface-protective coatings

correspondingly in A-Z and A-YSZ nanocomposite and hence, mainly to retain its tetragonal zirconia (t-ZrO_2) phase [19-22].

Thus, the structural stabilization of t-ZrO_2 in A-Z and A-YSZ nanocomposites at high temperature is mainly influenced by a stabilizing agent and its critical size effect [8,9]. Further, the stabilizing agent has a capability to inhibit the phase transformation from tetragonal zirconia to monoclinic zirconia (m-ZrO_2) [21,23]. Therefore, to achieve a stable structural phase of t-ZrO_2, it is essentially focused on different volume ratio of alumina, zirconia, and yttria compound [24-27]. The ratio of compound like zirconia (30-40 wt %), alumina (60-70 wt %) and yttria (3-9 wt %) content used here are contributed to retain the t-ZrO_2 phase

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**Criterion III
Metric 3.4.5**

A sensitive refining of *in vitro* and *in vivo* toxicological behavior of green synthesized ZnO nanoparticles from the shells of *Jatropha curcas* for multifunctional biomaterials development

R. Suriyaprabha[a], K.S. Balu[a], S. Karthik[a], M. Prabhu[b], V. Rajendran[a,c,*], Wilhelm K. Aicher[d], Malik Maaza[c,f]

[a] *Centre for Nano Science and Technology, K. S. Rangasamy College of Technology Tiruchengode, 637215, Tamil Nadu, India*
[b] *Department of Biomedical Engineering, Mahendra Institute of Technology Mahendhirapuri, 637503, Tamil Nadu, India*
[c] *Centre for Research, Dr. N. G. P. Arts and Science College, Coimbatore, 641048, Tamil Nadu, India*
[d] *Department of Urology, University of Tübingen Hospital, Waldhörnlestr. 22, 72072, Tübingen, Germany*
[e] *UNESCO-UNISA Africa Chair in Nanosciences Nanotechnology, College of Graduate Studies, University of South Africa, Muckleneuk Ridge, PO Box 392, Pretoria, South Africa*
[f] *Nanosciences African Network (NANOAFNET), iThemba LABS National Research Foundation, 1 Old Faure Road, PO Box 722, Somerset West, 7129, Western Cape, South Africa*

ARTICLE INFO

ABSTRACT

ZnO nanoparticles (NPs) possess a wide range of biological functions in pharmaceutical and cosmetic applications due to their excellent antimicrobial, optical and UV protective properties. This study first reports the toxicological assessment of ZnO NPs green synthesized from *Jatropha curcas* shells for multifunctional biomedical applications. The hot water extract of *J.curcas* shells is utilized as a chelating agent for the reduction of zinc acetate and then, the prepared ZnO NPs are broadly characterized using X-ray spectroscopic and electron microscopic observations. The prepared ZnO NPs acquire high purity (100%) wurtzite crystal with hexagonal structure with the average particle size of 53 nm. In vitro and in vivo toxicity evaluation against human tumor cell lines and zebrafish embryos have ascertained the purpose of ZnO NPs in clinical research. Toxic effects of ZnO NPs were observed by a dose-dependent reduction of bacterial growth at ≥ 1 $\mu g\,ml^{-1}$, by teratogenicity and genotoxicity in zebrafish embryos (from 3 to 90 $\mu g\,ml^{-1}$) and by a significant nanoparticle uptake (0.5 $ng\,\mu l^{-1}$) by a fish serum. In contrast, ZnO NPs fail to reduce the proliferation of human bladder tumor cells (UC6) and cell viability of A549 cells in vitro up to 500 $\mu g\,ml^{-1}$. All these observations limit the unobstructed application of ZnO NPs at higher concentrations. Thus, abundantly used metal oxide nanoparticles like ZnO NPs examined in our present study in different animal models under in vitro and in vivo conditions will be the significant screening strategy to determine the nanotoxicity.

1. Introduction

ZnO nanoparticles (NPs) are one of the well-known metal oxide nanoparticles for their wider applications in cosmetics, pharmaceuticals and surgical devices (Ma et al., 2013; Vimala et al., 2014; Iswarya et al., 2017). The synthesis of ZnO NPs is highly prevailed by many physical and chemical methods. Most of the chemical methods exorbitantly use the reducing agents which are found to be cytotoxic, expensive and hazardous to health (Ma et al., 2013; Sabir et al., 2014). In order to

The plant extract consists of complex organic and inorganic constituents which act as reducing/chelating agents with high efficiency. Even though several plant-based extracts are used to prepare various metal nanoparticles like Au, Ag, etc. (Kavitha et al., 2013; Ahmed and Ikram, 2015), few reports specifically demonstrate the use of plant extract for biological synthesis of ZnO NPs of biomedical importance (Thema et al., 2015; Diallo et al., 2015; Karthik et al., 2017). Plant extract-mediated synthesis is considered to be advantageous due to its simplicity in extract preparation in a large volume which avoids in vitro

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CROSS DOMAIN OPINION MINING USING MAXIMUM ENTROPY BASED CLASSIFIER

V.Manimekalai[1,] S.Gomathi @ Rohini[2]

[1]Department of Computer Technology, Dr.N.G.P Arts & Science College, Coimbatore, India

[2]Department of Computer Application, Sri Ramakrishna college of Arts and Science, Coimbatore, India

mkalai55@gmail.com[1], gomathi.s@srcas.ac.in[2]

Abstract--The current analysis is play a dominant role in opinion mining is additionally referred to as sentiment analysis because of clear volume of opinion made net resource like discussion type, review sites, blogs, and tweets area unit on the market in digital type. Sentiment analysis is that the field of study that analyzes client opinion, feedback, sentiment analysis, attitudes and feeling from communication. At intervals fraction second, we have a tendency to classify the text in several manner in several seconds. It's one in all the active analysis areas in linguistic communication process [NLP]. There are a unit range of techniques we want to classify the Opinion reviews. The main problematic in the sentiment analysis is to understand the usage of negation and the taxonomy of positive and negative sentiments recorded by the users in the social group. The proposed approach that extracts and classifies opinion words from one domain called source domain and predicts opinion words of another domain called target domain using a semi-supervised approach, its combines modified maximum entropy and bipartite graph clustering. A comparison of opinionclassification of reviews on four different product domains are presented. The results demonstrate that the proposed method perform relatively well in comparison to the other methods. Comparison of SentiWordNet of domain-specific and domain-independent words reveals that on an average 72.6% and 88.4% words, respectively, are correctly classified.

Keywords— Sentiment analysis, Navies Bayes, Support vector machine, Aspect extraction, Positive and negative

1.   INTRODUCTION

Sentiment is an emotion or feelings in the customer's feedback to be analysis in data mining process and the technique to extract and capture the data for analysis in language process and linguistic matter analysis it's accustomed extract and analyze info from the net order to recognize the subjective opinion of a document or assortment of documents, like web log posts, reviews, news articles and social media feeds like tweets and standing updates Sentiment Classification aims at mining the planet Wide net text of product reviews by customers to classify the reviews into positive or negative opinions [1]. Automated opinion mining from the reviews is beneficial to both consumers and sellers.

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Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Review On Template Matching And Registration Of Retina Images For Teleophthalmology

Mrs.B.Sivaranjani, Dr.C.Kalaiselvi

Abstract: The process of diagnosis and treatment concerned with various ailments that affects the retina and the choroid beneath it need acquiring a set of fund us images, which uses the fund us camera. Also, these images require processing for achieving a better form of diagnosis and also treatment planning. The process of retinal image template matching is highly necessary for the extraction of particular features, which may be of immense use in diagnosis and medical treatment. In addition, registration of retinal images is hugely valuable during the extraction the motion parameters, which aid in creating an entire map on the eye's retina and also in retinal tracking process. This research work presents an analysis for the image preprocessing, dimensionality reduction, template matching and registration approaches, which were reported for retinal images also.

Index Terms: Retinal images, Registration, Segmentation, Motion Parameter Estimation, Real Time Tracking, Template matching

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1. INTRODUCTION

Retinal image processing is hugely necessary for the diagnosis and treatment planning of several diseases that affect the retina and the choroid element beneath it [1], [2]. Diabetic retinopathy is one among the criticalities associated with diabetes mellitus that affect the choroid and the retina. In this scenario, a network consisting of small blood vessels, known aschoroidal neovascularisation (CNV), develops in the choroid and using a part of the blood that is supplied to the retina. With the amount of blood that is supplied to the retina being reduced, the sight may be deteriorated and in critical scenarios, loss of sight may happen. The clinical experts attempt to provide treatment to this life-threatening ailment by using optical energy for the photocoagulation of the neovascularisation. For this, argon laser is employed in photocoagulation for cauterizing the small vessels that leads to an increase in the amount of blood that supplies to the retinal part and therefore the eye sight is maintained. This modality of treatment is attained in several steps. The doctor requests the patient to fix their eye in position so that the laser beam can be directed to the region affected. The present rate of success of this process is lesser than 50% for CNV treatment, after one session of treatment having a repetition and/or persistence rate of nearly 50%. The latter state needs performing the treatment again. But, a 50% failure rate is expected on repeating the treatment. In addition, various studies show that unfinished treatment corresponds to inferior

a reliable registration approach has to be used for the detection of the retina's motion parameters for updating the positions of laser rays in accordance. [5]. Also, the fund us camera is able to capture an image of a part of the retina, however not the entire retina. The doctor, at times requires a full image of the retina so that a better diagnosis and therefore planning a good treatment is possible. The solution to this problem may be obtained with the help of few image processing algorithms to develop a full map of the retina. Here, in this research work, several image denoising, template matching, segmentation, dimensionality reduction and registration approaches, which were tested to offer the best performance for retinal images, are studied. These algorithms were used for the images in study for ensuring its usefulness and accuracy.

2. LITERATURE SURVEY

The study clearly describes the concept of different processes of retinal images

2.1 Survey on Retina Image Preprocessing

An important problem faced by medical imaging systems is the impairment of visual signals acquired, owing to improper capture and transmission errors. Visual aberrations may develop owing to different factors such as time of exposure, lighting, and movement of eye and sensitivity of the imaging devices. These impact the images in terms of contrast,

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Research Article

Influence of nanoflower $FeTiO_3$ in carbon dioxide reduction

Siva Palanisamy[1] · Surendhiran Srinivasan[1] · Arunkumar Prabhakaran Shyma[1] · Naveenkumar Rajendhran[1] · Karthik Subramani[1] · Vinoth Murugan[1] · Rajendran Venkatachalam[1,2]

Abstract

The effect of electrochemical reduction of carbon dioxide (CO_2) by changing the structure and morphology of $FeTiO_3$ nanoparticle prepared through sol–gel and hydrothermal methods is explained in this study. $FeTiO_3$ nanoparticles were used as a cathode where as a stainless steel plate and CO_2 saturated $NaHCO_3$ were used as an anode and an electrolyte, respectively. The cyclic voltammetry and linear sweep voltammetry analysis were carried out comprehensively on $FeTiO_3$-SG and $FeTiO_3$-HT-coated electrodes to decouple the electrochemical reduction processes of CO_2 in aqueous solution. The charge transfer resistance and the product gases were studied using electrochemical impedance spectroscopy and gas chromatography, respectively. The observed results were analyzed in light of structure/morphology, particle size, and surface area of $FeTiO_3$ nanoparticles and their influence on the effective cathodic behavior in CO_2 to CO reduction.

Keywords Electrochemical reduction · Nanoflower $FeTiO_3$ · Cyclic voltammetry · CO_2 reduction · Cathodic behavior

1 Introduction

The knowledge on the environmental impact of the greenhouse gas emission is mandatory to for health and environment. Even though, many processes are responsible for emission of the greenhouse gases, the CO_2 reduction and conversion by natural process need intensive studies [1–4]. The increased release of CO_2 to the environment as a result of emission of gases from natural/automotive/industries leads to its drastic increase in the atmosphere [5, 6]. This may lead to many adverse effects on the atmos-

control of electrode potentials and reaction temperature, recycling of opinionated electrolytes to minimize its consumption as simple water or waste water, self-generation of electricity to drive the process without generating any new CO_2 sources, and a compact, modular, on-demand, and easy to scale up electronic system for CO_2 reduction [10]. Recently, electrochemical reductions of CO_2 on mercury and amalgam cathodes are used to produce formic acid [11–16]. Among the various metal oxides used for the cathodic reduction, the materials such as $FeTiO_3$ are used for simultaneous reduction of CO_2 and NO_3 [17]. Attempts

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Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Reconnaissance Artificial Bee Colony Routing Protocol To Detect Dynamic Link Failure In Wireless Sensor Network

S.Nithyanandh, Dr.V.Jaiganesh

Abstract: In the current world of science and information technology, Wireless Sensor Networks (WSNs) have stepped-in to enhance the existent solutions in terms of saving energy and reducing delay. WSNs are mostly deployed in the scenarios that are never been faced which lead to performance degradation. Routing protocols play a vital role in WSNs in finding the perfect path between nodes, because routing protocols are the core responsibility for the network failure or success. In this paper, Reconnaissance Artificial Bee Colony Routing Protocol is proposed for outstanding routing in WSNs, which aims in finding the better route towards destination in an optimization enabled manner. The main goal of the proposed protocol is to spot the link failures that arise dynamically and find the best alternate route. This research paper uses the selective benchmark metrics in order to evaluate the proposed protocol in opposition to previous protocols in NS2. The results indicates that the proposed protocol having better performance than the previous protocols.

Keywords: Energy, Optimization, Bee Colony, Delay, WSN, Routing.

1. INTRODUCTION

Wireless Sensor Network (WSN) is a common term to indicate a liberated set of miniature computers with the objective of sensing the current environment such as temperature, air humidity, radiations etc. WSN is made of multiple (hundreds or thousands) sensor nodes. The nodes in WSN get linked with each other by means wireless medium. Naturally, there exist a master node in the network to share the sensed information to the outside world. Before utilizing the WSN for the usage, many assumptions were made and it indicates that WSN is entirely different from other types of wireless network. In general, the resources are extremely limited to the nodes in WSN. To sense the large scale areas, the processing cost of the nodes must be low. The processing cost indicates the memory and energy utilization. The applications of WSN mainly need the network components which consume energy in minimum. The term minimum indicates the level that is below the normal power utilization. The sensor nodes that are used in industries, medical field, badges and smart tags are inbuilt with coin size batteries which need to sustain for multiple months and years. The most applications in WSN are used for monitoring and controlling the equipments, but it need extended battery life. Also, the environment such as seas and forest monitoring include huge number of devices, where the frequency of battery replacement is very low. In short, WSN is becoming a major part of human lives. Currently, tremendous researches are being done in this research area to enhance the quality of service. To understand the research works to be carried out in WSN, excellent communication protocols are necessary. The inbuilt properties in sensor nodes faces multiple challenges when interacting with communication protocols, such as consumption of energy.

The protocols of WSN are necessary to be tailored to enhance the performance such as delay, throughput and control overhead, but its main focus will be on reducing the energy consumption. The positions of the nodes are not considered to enhance the performance of WSN. Multi-hop communications are explored in nodes communications leading to minimum consumption of energy, which is better than communication in single-hop data transmission. The performance degradation in WSN gets happen due to link failures. The sensor nodes can identify its current status regarding the available energy, where sometimes the neighbor node can identify. The process involved in network management too can find the node status and initiate the steps to rectify it. In this regard, if a node wants to transmit the data means it will wait for the different time period to find the best path to destination. Construction of route initiates the control overheads in WSN which leads to shortened network lifetime or network failure. In critical applications like patient monitoring and defense area monitoring delay may lead to huge loss. Therefore, the optimization needs gets increased for (a) finding the link or node failure, (b) discovering the best route from sender node to receiver node, (c) alternate route detection.

2. BACKGROUND STUDY

Fuzzy Grid Routing Algorithm [1] aimed to save the battery life of sensor node in WSN in order to increase the lifetime. Routing was performed by utilizing the grid coordinator concept with the help of fuzzy rule which focused only on reducing the count of hop, but the results shows that the network lifetime got reduced. Ant Routing [2] was proposed to increase the routing quality by building the network hierarchy, which will be estimated to build before choosing the path. Ant Routing was proposed to utilize only the best path due to transferring the multimedia data. The result

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Dr. N.G.P. – Kalapatti Road, Coimbatore-641048, Tamil Nadu, India
Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Multiclass Data Imbalance Oversampling Techniques (Mudiot) and Random Selection of Features

V.Shobana,K.Nandhini

Abstract: Class imbalance is a serious issue in classification problem. If a class is unevenly distributed the classification algorithm unable to classify the response variable, which will result in inaccuracy. The technique Multiclass Data Imbalance Oversampling Techniques (MuDIOT) is to find out the factors which have a hidden negative impact on classification. To alleviate the negative impact the technique MuDIOT concentrates on balancing the data and the result minimizes the problems raised due to uneven distribution of classes. The dataset chosen has a multiclass distribution problem and it is handled to produce better results of classification.

Keywords: Imbalanced data, data preprocessing, big data, MuDIOT, SMOTE, RFE, random forest
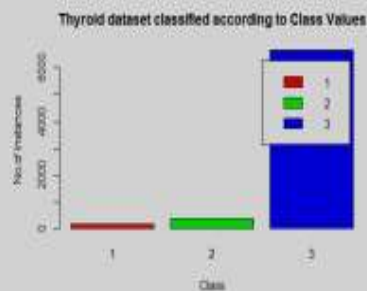
I. INTRODUCTION

Classification coined as most common factor in machine learning. It is referred as the process of classifying an unpredicted, unordered value.[1]. It contains algorithms applied to the data and build the model that can be classified and discovers the dependencies behind class attributes. After that, new labels are tested and classified to the predicted groups. The data produced so far has its unique characteristics. Based on the characteristics alone we cannot build the perfect model. Most of the real world applications, particularly in healthcare, retrieving and calculating the required parameters is expensive and may not be done at all. Gathering samples from each of the above mentioned classes is difficult because of the above factors. When one class samples is more in number than that of other class, it is known as class imbalance problem. It is a common thing in medical databases when a large number of patient data is taken into consideration.[1]Multiclass Data Imbalance Oversampling Techniques (MuDIOT) deals with this problem by random sampling of minority classes. It deals

The classes which are not evenly distributed is the major issue which is in attention until 1990s [7]. In the year 2005 dealing with imbalanced cost effective data was a major issue and it occupies the top ten 10 challenging issues in data mining.[8] Another problem in medical dataset is which attributes to choose for classification. It results in Feature Selection and a variety of methods available for selecting the top features.

II. BACKGROUND

2.1 Imbalanced Data Identification

The imbalanced class distribution defined as the relation between more numbers in majority class than that of minority class.[9].This lack of equality occurs in most of the medical databases, where different patients are diagnosed for different illness. These types of patients require special treatment. In specific cases, the datasets are fairly imbalanced with a imbalance ratio of, 1:10000 [7]. The classification and prediction algorithm shows improper classifiers and predictors on applying imbalanced dataset. The figure 1 shows the uneven distribution of classes.

Thyroid dataset classified according to Class Values

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Dr. N.G.P. – Kalapatti Road, Coimbatore-641048, Tamil Nadu, India
Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Missing Value Aware Optimal Feature Selection Method for Efficient Big Data Mining Process

S. Meera, B. Rosiline Jeetha

Abstract— Big mining plays a more critical role in the real world environment due to presence of large volume of data with different varieties and type. Handling these data values and predicting the information would be the more difficult task which needs to be concerned more to obtain the useful knowledge. This is achieved in our previous research work by introducing the Enhanced Particle Swarm Optimization with Genetic Algorithm – Modified Artificial Neural Network (EPSOGA -MANN) which can select the optimal features from the big volume of data. However this research work might be reduced in its performance due to presence of missing values in the dataset. And also this method is more complex to perform due to increased computational overhead of ANN algorithm. This is resolved in the proposed research method by introducing the method namely Missing Value concerned Optimal Feature Selection Method (MV-OFSM). In this research method Improved KNN imputation algorithm is introduced to handle the missing values. And then Dynamic clustering method is introduced to cluster the dataset based on closeness measure. Then Anarchies Society Optimization (ASO) based feature selection approach is applied for performing feature selection in the given dataset. Finally a Hybrid ANN-GA classification technique is applied for implementing the classification. The overall performance evaluation of the research method is performed in the matlab simulation environment from which it is proved that the proposed research method leads to provide the better performance than the existing research technique.

Keywords— Feature Selection, Missing Value Handling, Preprocessing, Dynamic Clustering, Closeness Measure.

I. INTRODUCTION

Feature-selection techniques are an important part of machine learning [1]. Feature selection is often termed as variable selection, attribute selection and variable subset selection. It is the process of reducing input features to the features that are most informative to reduce streaming data size.

In streaming feature selection, the candidate features arrive sequentially. The size of these features is unknown. Streaming feature selection has a critical role in real time applications, for which the required action must be taken immediately [3]. In applications such as weather forecasting, transportation, stock markets, clinical research, natural disasters, call records, and vital-sign monitoring, streaming feature selection plays a key role in efficiently and effectively preparing big data for the analysis process in real time [4].

In this work feature selection process is analyzed on the big data. This is done by introducing the various methods that can lead to optimal outcome. This research method concentrates on the feature selection process with the presence of missing values in the data set [5]. The missing values in the data set would lead to incorrect decision which needs to be handled with more concern to ensure the accurate and proper feature selection and decision making [6]. In this research method Improved KNN imputation algorithm is introduced to handle the missing values. And then Dynamic clustering method is introduced to cluster the dataset based on closeness measure. Then Anarchies Society Optimization (ASO) based feature selection approach is applied for performing feature selection in the given dataset. Finally a Hybrid ANN-GA classification technique is applied for implementing the classification.

The overall organization of the research work is given as follows: In this section detailed introduction about the feature selection issues and the classification performance degradation due to processing irrelevant features are given

Review Of Scheduling Methodologies Of Virtual Machines (Vms) In Heterogeneous Cloud Computing

S.Rekha, Dr.C.Kalaiselvi

Abstract: Cloud computing is a most excellent technology and users are in require of more service and higher effectiveness load balancing and scheduling plays the major significant role in cloud computing. In cloud efforts are reduced and also give service interaction to the user. By this users are able to help to pay for what they use. Lots of methods are introduced for describing the several scheduling tasks. Because Cloud computing handles with many user's suitable decisions are needed for every scheduled job. In this paper, we have reviewed about the details of different algorithms proposed to resolve the issue of task scheduling in cloud computing. This paper provides detailed review of various studies on different algorithms with the purpose of is explained to overcome the common issues recognized in different scheduling tasks. If the scheduling tasks are performed efficiently then it results to balance the load in cloud based on the resources and workloads. Since the variety of scheduling algorithms are used by load balancers to determine which backend server to send a request to VM. It is also the responsibility of the provider to dynamically reallocate or migrate the VM across physical machines for workload consolidation and to avoid over utilization or under utilization of resources.

Keywords: Cloud Computing system, Virtual Machine scheduling, scheduling algorithms, heterogeneous workload, and Quality of Service (QoS), Virtual Machine (VM).

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1. INTRODUCTION

Cloud Computing is an emerging technique. Recently it is found that researchers are interested in using cloud for performing scientific applications and even the big organizations are on the verse of switching over to hybrid cloud. Many complex applications require parallel processing to execute the jobs effectively. Due to the communication and synchronization among parallel processes there is a decrease in utilization of Central Processing Unit (CPU) resources. It is necessary for a data center to achieve the utilization of nodes while maintaining the level of responsiveness of parallel jobs. The cloud computing is attracting an increased number of applications to run in the remote data centers. Many complex applications require parallel processing capabilities. Some of the parallel applications show a decrease in utilization of CPU resources whenever there is an increase in parallelism if the jobs are not schedule correctly then it reduces the computer performance.

Clouds provide a very large number of resources, including platforms for computation, data centers, storages, Networks, firewalls and software in form of services. At the same time it also provides the ways of managing these resources such that users of cloud can access them without facing any kind of performance related problems. Several algorithms & protocols are proposed in the regarding of scheduling mechanism [1] in cloud computing. But very few algorithms are proposed to detect the scheduling mechanism in cloud computing. Many of them consider a regular monitoring region in their protocol, which is not a real life scenario. Practically the monitoring region with improved performance is always irregular as the clouds are randomly deployed [2-3]. Virtual Machine (VM) is an execution unit that acts as a foundation for cloud computing technology. Virtualization consists of creation, execution, and management of a hosting environment for various applications and resources. The VMs in the cloud computing environment share resources like processing cores, system bus, and so forth. The computing resources available for each VM are constrained by total processing power. In this model of environment the job arrival pattern is

Designing Weather Based Crop Insurance Payout Estimation Based on Agro-Meteorological Data using Machine Learning Techniques

K.P.Mangani , R.Kousalya

Abstract: Data mining techniques have been extensively used to mine up-to-date information from agricultural databases. In Agriculture, the Loss Assessment and Estimation in Crop insurance can be done on various factors like yield-based, crop-health based and weather-based variations. Weather-based variations are taken into account to design the insurance payout classifier model for the selected crop within the selected agricultural blocks of Tamilnadu. Then the weather attributes that undergone feature selection are given as input to the model with the rule-based classification algorithm implementing the neighboring approach with a sequential covering strategy named as CBKNN-PAYRULE which is statistically higher than other state-of-the-art rule-based classification algorithms. This model is proposed to classify the agricultural blocks based on the Area-wise Assessment of adverse temperature for the groundnut crop from their nearest neighbor. Then By combining the classified neighboring approach with the threshold factors the Rule-based classifier is done to generate the rules to estimate the insurance payout value as per policymakers for the selected agricultural

provide economic support to farmers depends upon the crop to soothe their farm profits and persuade them to apply technology in agriculture, reduce indebtedness and decrease the need for relief measures. The farmer should have a better option to insurance his crop and transfer the hazard to the insurer. The insurer can estimate the weather risk factor and the payout to be paid to the farmer. Risk factors include Geographical basis risk, product basis risk, and product design basis risk. Product basis risk covers risk arising from deviations in parametric weather indices. The Risk could be high for rainfall, temperature and moderate for others factor like frost, heat, humidity, etc. Crop insurance provides a safety-net for farmers to mitigate losses arising from adverse climatic conditions and also encourages them to continue to invest in inputs and technology to record the loss assessment and increase the yields. Many practical data mining systems are used for predicting the insurance payout for the specified crop based on average temperature and rainfall that deal with

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Dr. N.G.P. – Kalapatti Road, Coimbatore-641048, Tamil Nadu, India
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Metric 3.4.5

Euler Movement Firefly Algorithm and Fuzzy Kernel Support Vector Machine Classifier for Keystroke Authentication

M. Rathi, A. V. Senthil Kumar

Abstract: User authentication can be successfully employed using keyboard typing patterns which is a form of behavioural biometrics. This modern method is highly analyzed for static authentication which refers to typing of fixed texts like 'password' and 'pin numbers'. Most of the methods with respect to keystroke dynamics are restricted to the study of user's activity involving fixed text. The formulated work concentrates on the investigation of the log of the user activity focused on the keyboard usage within the computer system through free text which refers to typing of texts throughout the login session. The Buffalo dataset is used in User Profiling Similarity Measurement (UPSM) stage and to recognize the time slice of the users, Euler Movement Firefly Algorithm (EMFA) is utilized. The typing behaviour is formulated in the form of time series in User Profiling Continuous Keystroke Authentication (UPCKA). Moreover the progression is made to user's Continuous Authentication so as to predict unauthorized users with the consideration of the classifier called Novel Fuzzy Kernel Support Vector Machine (NFKSVM). The experimental results provide the enhanced performance by utilizing the formulated UPCKA in correlation with the NFKSVM classifier when compared with SVM and Iterative Keystroke Continuous Authentication (IKCA) techniques.

INDEX TERMS: Keystroke, Keystroke Time Series, Continuous Authentication, Buffalo dataset, User Profiling Similarity Measurement (UPSM) and User Profiling Continuous Keystroke Authentication (UPCKA).

I. INTRODUCTION

The greater diffusion of the digital recognitions has led to the development of security issues due to data transmissions [1]. Nowadays, the perspective of the large diffusion involving in the various activities transmitted over the internet through events like online transactions in banking, transaction involving E-commerce, communication through e-mail tends to suffer

As the computers may be subjected to unauthorized users whenever the user is left from the workstation without ending the session. Similarly the unauthorized users could handle the system pretending like a legitimate person, which leads to theft of identity [3]. Out of several methods one such technique to solve the issue caused by the intrusion is that the use of detection mechanisms that focus on workstation (host-based).

Keystroke dynamics [4-5] (typing patterns) are considered to be the challenging tasks for the persistent authentication. To authenticate the typing patterns of an individual, the initial task was subjected to the text that remains static. For instance, static authentication related to that of typing pattern, the rhythm, recognize only when the users enter their credential data (username and password, or pin number) [6–7]. Keystroke dynamics is considered to be significantly precise to the choice of authentication due to its degree of transparency it produces. The most obvious way to take advantage of it is to gather timing information on data that users have already typed to login into the system—that is, username and password. Keystroke Static Authentication (KSA) has been subjected by considering the applications including username, password and pin number authentication [6–7]. KSA remains unsuitable for the applications that are in need of regular authentication like the context of the online assessments applied in eLearning environments. Hence, Keystroke Continuous Authentication (KCA) is required. When compared to KSA , KCA is considered to be more promising as the process focuses on discovering patterns from the text which is set free (not as to that of KSA planning for a fixed pattern which remains single). The working strategy of KCA till date has focused on feature vector based binary classification where the statistical features like the average hold time (duration of a

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ORIGINAL PAPER

Water-dispersible graphene–wrapped MnO₂ nanospheres and their applications in coin cell supercapacitors

Siva Palanisamy[1] · Arunkumar Prabhakaran Shyma[1] · Surendhiran Srinivasan[1] · Naveen kumar Rajendran[1] · Rajendran Venkatachalam[1,2]

Abstract

A highly stable and more water-dispersible graphene (WDG) was synthesized using microwave-assisted ball milling technique. The WDG-wrapped MnO_2 nanocomposites were prepared for two mass ratios of nanospheres and graphene sheets using reflux method. Comprehensive characterization of the prepared WDG-Mn1 and WDG-Mn2 hybrid nanocomposites was carried out to explore the electrochemical capacitance behaviors. The WDG-Mn1 and WDG-Mn2 electrodes showed capacitance performance of 130 F g^{-1} at 0.5 A g^{-1} and 178 F g^{-1} at 0.5 A g^{-1}, respectively. The WDG-Mn2 electrode revealed enhanced capacitance performance, that is, 84% of its initial capacitance was retained even after repeating the cyclic voltammetry test for 3000 cycles. This study reveals the enhanced capacity performance in WDG-Mn2 nanocomposite hybrid materials for supercapacitors.

Keywords Water-dispersible graphene · Coin cell · Supercapacitor · Gel electrolyte · Charge–discharge

Introduction

Supercapacitors have gained significant importance worldwide due to their higher power density, excellent reversibility, and long cycle life than batteries. Owing to high power performance, long life cycle, and low maintenance cost, supercapacitors are believed to be a potential candidate for energy storage applications [1–7]. Extensive research on the development of different electrode materials such as conductive polymer [8], transition metal oxide [9], and various forms of carbon [10] has been gaining importance. Among various forms of carbon such as graphite, carbon black, and CNT, graphene is the most promising material that finds extensive superior electrical conductivity, and high thermal and chemical stability [11].

Many methods such as Hummers' [2, 12] electrochemical [13] and polymer exfoliation [14, 15] are used to synthesize graphene from graphite oxide (GO). The traditional synthesis methods of graphene yield less quantity and higher chemical wastage. In general, graphene shows a restacking effect; it is difficult to anchor metal oxides with graphene [16]. The water-dispersible/soluble form of graphene might reduce the restacking of graphene and hence it enables the anchorage with metal oxides. The water-dispersible graphene (WDG) can be easily dispersed in a metal oxide precursor solution to obtain enhanced properties. Further, WDG has a crucial role

Adaptive Particle Swarm Optimization based Credentialed Extreme Learning Machine Classifier (APSO-CELMC) for High Dimensional Datasets

M.Praveena, V. Jaiganesh

Abstract: Data mining is a key research field in the computer science research arena. Feature selection is performed once the dataset got cleansed. Optimization algorithms are considered to be helpful for the feature selection task. Also the obtained suitable features will contribute considerably for the classifier. Machine learning classifiers are comparatively performing better than that of traditional data mining classification algorithms. In this part of research work an adaptive particle swarm optimization algorithm is employed in order to perform feature selection task. Extreme learning machine classifier is added with credential weights. Twenty datasets are taken for performance analysis. From the obtained results it is evident that Adaptive Particle Swarm Optimization based Credentialed Extreme Learning Machine Classifier (APSO-CELMC) performs better in terms of predictive accuracy and time taken for classification.

Index Terms: Machine learning, feed forward neural network, extreme learning machine, optimization, particle swarm, swarm intelligence, high dimensional datasets..

I. INTRODUCTION

Data mining is one of the active research areas in the field of computer science as well as information technology. During the past two decades there is a knowledge data discovery progression assists the data mining to pull out hidden information from the dataset, there is a mammoth

learning, unsupervised learning and reinforcement learning and is shown in Fig.1. The succession of machine learning is corresponding to that of data mining. Both data mining and machine learning examine as well as search from end to end data to seem for patterns. Conversely, in penchant to extracting data for human knowledge as is the case in data mining applications; machine learning employs data to recognize patterns in data and tweak program actions henceforth.
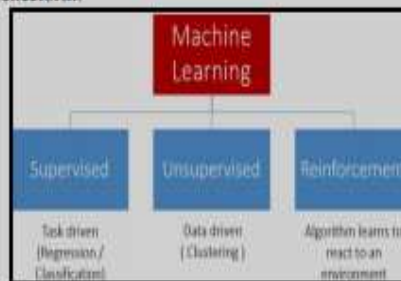
Fig.1. Machine Learning and its Types

Supervised machine learning is the task of inference a meaning from labeled training data that consists of a collection of training examples. As far as supervised learning is concerned, each instance is a brace encloses an input object (which is usually a vector quantity) and a vital output value (may also be referred as supervisory signal). Initially, the supervised learning algorithm does the analysis task from the training data and builds a dependent function for mapping

Enhanced Photovoltaic Performance of Hybrid Solar Cells with a Calcium Interfacial Metal Electrode

MURUGAN VINOTH,[1] SRINIVASAN SURENDHIRAN,[1]
PEMMAN RATHINAM SENTHILMURUGAN,[1]
and VENKATACHALAM RAJENDRAN [1,2,3,4]

1.—Centre for Nano Science and Technology, K. S. Rangasamy College of Technology, Tiruchengode, Tamil Nadu 637215, India. 2.—Centre for Nano Science and Technology, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu 641048, India. 3.—e-mail: veerajendran@gmail.com. 4.—e-mail: vrajendran@drngpasc.ac.in

A better understanding of how the interfacial layer influences charge carrier recombination would benefit the development of high-efficiency hybrid solar cells (HSCs). HSCs based on poly(3-hexylthiophene) (P3HT)/Si nanoparticles (Si NPs) with three identical electrodes were used as reference system to investigate the interfacial layer effects on device performance. The standard solar-grade silicon was produced using rice husk ash (RHA) as a biogenic source. The RHA was purified by using a low-cost and simple method followed by modified magnesiothermic reduction reaction to produce crystalline Si NPs. Prepared Si NPs as an acceptor material with different percentages of Ca interface layer metal electrodes on HSCs were studied. A highly conductive electrode was one of the important factors for enhancing the fill factor and power conversion efficiency (PCE). For fabrication and characterization of P3HT/Si NP HSCs with three identical thermally evaporated electrodes, Al (100 nm), Ca/Al (10 nm/90 nm), and Ca/Al (20 nm/80 nm) were used as top electrode. The device with a Ca/Al (10 nm/90 nm) electrode exhibited a lower recombination, while its efficiency was 20% and 10% higher than the devices with the Al (100 nm) and Ca/Al (20 nm/80 nm) electrodes, respectively.

Key words: Hybrid solar cells, interface, electrode, built-in field, charge recombination

INTRODUCTION

methods.[2–5] The methods used to produce high-

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Predicting academic performance of student using classification techniques

Publisher: IEEE

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PDF

Sagardeep Roy ; Anchal Garg   All Authors

Abstract

Document Sections

I. Introduction

II. Literature Review

III. Methodology

IV. Results and Discussions

V. Conclusion

Authors

Abstract:

Data Mining methods are applied on educational data with the intent of enhancing teaching methods, improving quality of teaching, identifying weak students, identify factors that influence Student's academic performance. This utilization of data mining methods to elevate quality of education, identifying students who need improvement is termed as educational data mining. EDM has become a major research interest for many researchers. The primary function of educational data mining is prediction of student's academic performance. [1] Predicting student's academic performance helps in identifying a number of things like students who are likely to drop out, students who are weak and needs improvement, students who are good in academics but lately deteriorated. The intent of this paper is to determine factors that can influence a student's academic performance.

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Round Trip Latency Based Authentication Scheme in Fog-Enabled Cloud Computing System

C. Nagarani, R. Kousalya

Abstract: In fog-enabled cloud computing framework, one of the most challenges is security promises due to the compromised passwords. To overcome this issue, different multifactor authentication schemes have been developed that requires additional authentication credentials along with the standard password to authenticate the login. Among those schemes, Communication Latency-based Authentication Scheme (CLAS) increases the protection of conventional web authentication schemes by leveraging the Round Trip network communication Latency (RTL) between clients and authenticators together with standard password. It uses RTL of clients to secure against password compromise. On the other hand, it can support compromise of either the password or the profiled location of a user. This makes it susceptible to same location attacks. As a result, an integration of additional profiling features is needed to attain more robust and flexible defense against password compromise. Hence in this paper, an extended CLAS is proposed that mainly investigates the mobility and same location challenges in CLAS. Initially, the legitimate login failures are solved by handling both selective and arbitrary mobility of users. For selective mobility case, CLAS generates an individual profile for each location and the user may be granted access if his/her real-time login profile matches any of the stored reference profiles. For arbitrary mobility case, CLAS is integrated with two-factor authentication mechanism to authenticate the user. In addition, the defense against Mimic attacks is improved by utility metric-based location anonymization and obfuscation of RTL algorithms. By using these algorithms, the user's locations are anonymized and the values of RTL are obfuscated to defend against user compromise attempts for impersonating the RTL by getting nearer to the user location. Moreover, a keystroke dynamics measure is introduced with obfuscated RTL measures to effectively defend the same location attacks. This technique alleviates the potential impacts of network instabilities on RTL.

Due to this, the data transmission overhead is reduced and the performance of cloud computing is improved efficiently. Mostly, the fog computing paradigm is encouraged by the rapid growth of Internet-of-Things (IoT) devices. When using a normal client-server framework, there may be challenges in scalability and reliability due to high overload in the server. These challenges can solve by the fog paradigm which provides the scalable decentralized solution. This can be achieved by the novel hierarchically distributed and local platform known as fog computing between the cloud system and end-user devices [1-3]. Generally, a fog system has its own benefits such as it requires relatively less computing resources for memory and storage, high ability to process the data from different set of devices, etc. Owing to fewer requirements of resources, it may have a complexity to carry out a complete set of defence solutions for attacks detection and mitigation. On the other hand, there are no precise defence certifications and measures for this framework. Also, authentication and authorization solutions are not appropriate for this platform since fog devices are operating at the edge of networks. The functioning settings of fog devices may experience with several intimidations that do not present in a well-managed cloud.

Normally, fog devices have various sort of connectivity to the secluded cloud authentication server which is used for distributing the authentication data and collecting audit logs. Nevertheless, this connectivity may be measured in certain settings such as smart grid. Probably, an authentication protocol such as isolated authentication dial in user service

Dynamic Link Failure Detection using Robust Virus Swarm Routing Protocol in Wireless Sensor Network

Nithyanandh S, Jaiganesh V

***Abstract**: Wireless Sensor Networks (WSN) gets weak due to node failures because of different reasons like intervention and faults that arise in communication. These kind of failures makes the entire network failure or disconnect part of the network leading to link failure. Routing protocols are responsible to find the best route to destination, because link failure minimizes the entire quality of service. Hence, there exist a need to find the preeminent route between source and destination which makes the communication in a efficient manner. Optimization started playing a major role in research, specifically in mining and networking issues. This paper aims to propose a optimization based routing protocol namely robust virus swarm routing protocol in order to effectively detect the link failures to find the alternative path and efficiently utilize the available energy to extend the network lifetime. The proposed protocol works by utilizing the dissemination and infection method followed by virus which defends the host-cell for the survival and progression. This research work uses the benchmark performance metrics to evaluate the proposed protocol against the existing protocols in the simulator NS2. The result shows that the proposed protocol outperforms the existing protocols in terms of all the metrics.*

***Index Terms**: Wireless Sensor Network, Delay, Energy, Routing, Optimization*

I. INTRODUCTION

Sensor Network (SN) is an infrastructure based network that is made up of elements that are related to sensor communication. It provides the chance to the user to take a just-in-time action to avoid risks. The users are not limited to a specific domain, and they may be different domains like industry, e-commerce, and government. The environments of the sensor network are related to the real-time world manage energy consumption and better routing. Nodes of WSN are limited to energy, so it's necessary to consider it while designing a routing protocol. The routing protocols get differ from application to application, because of the network architecture. Routing issues in WSN provides challenges in efficiency and responsiveness while facing the trade-off, where it should balance the processing power and overhead in communications. Overhead in WSN is measured by utilization of bandwidth and consumption of energy. Finding a solution for these kind of issues end with a challenge in routing. Hence, special care is needed while designing a routing protocol for WSN.

Routing protocol utilizes different concepts to find an optimum network for better data transfer. Routing protocols are differentiated based on the characteristics of processing the routing information. The three different types of routing protocols available for ad hoc networks are: (a) proactive routing protocols; (b) reactive routing protocols, (c) hybrid routing protocols. Proactive routing protocols are also called as table-drive-protocol, where it depends on the propagation of period with accurate and consistent routing tables. The network structure is either hierarchical or flat. The overhead of the network gets increased when there exists a change in the environment. Reactive routing protocols are also called as on-demand protocols, where it depends on establishing the routes only when there exists a demand. This kind of routing protocols won't maintain the complete information of nodes in the network, because the routing paths are searched in a dynamic manner between source and destination. It utilizes the concept of flooding for discovering a route, but it has its characteristics to control it. Hybrid routing protocols depend

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Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Groundnut shell -a beneficial bio-waste

Pham Anh Duc[a], P. Dharanipriya[b], Bharath Kumar Velmurugan[c,*,1], M. Shanmugavadivu[b,**,1]

[a] Faculty of Environment and Labour Safety, Ton Duc Thang University, Ho Chi Minh City, Viet nam
[b] Department of Biotechnology, Dr. N. G. P. Arts and Science College, Coimbatore, India
[c] Toxicology and Biomedicine Research Group, Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Viet nam

ARTICLE INFO

Keywords:
Groundnut shells
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Biosorbent
Hemicellulose
Zero waste production

ABSTRACT

Groundnut shells account for approximately 20% of the dried peanut pod by weight, meaning there is a significant amount of shell residual left after groundnut processing. Increased groundnut production leads to the accumulation of these groundnut shells which is not utilized, thus either burnt or buried. As Groundnut shells are rich in many functional compounds and composed of cellulose, hemicellulose and lignin, it can be utilized in multiple ways. This review highlights potential applications of groundnut shells for commercial and industrial purposes. Groundnut shells can be converted in various bio-products such as biodiesel, bioethanol, nano-sheet and also has applications in enzyme and hydrogen production, dye and heavy metal degradation etc. An efficient management strategy is required to convert this otherwise considered waste into valuable bio-products to achieve zero waste production system.

1. Introduction

Groundnut is a nutritious leguminous crop, grown mainly for seed and oil worldwide. Groundnut shells are the leftover product obtained after the removal of groundnut seed from its pod. This is the abundant

use in composting wet materials, for wastewater treatment, plastic, wardrobes and also used as insulation board, metal casting, and a medium for pesticides as well as activated carbon. However, the major disadvantage of its use in large scale industrial process is the higher lignin content, which is mainly responsible for its resistance to biode-

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Web: www.drngpasc.ac.in |Email: info@drngpasc.ac.in | Phone: +91-422-2369100

ORIGINAL ARTICLE

Explosives properties of high energetic trinitrophenyl nitramide molecules: A DFT and AIM analysis

CrossMark

V. Anbu [a,*], K.A. Vijayalakshmi [b,*], R. Karunathan [c], A. David Stephen [d], P.V. Nidhin [d]

[a] Research & Development Centre, Bharathiar University, Coimbatore 641 046, India
[b] Department of Physics, Sri Vasavi College, Erode 638 316, India
[c] Department of Physics, Dr. NGP Arts & Science College, Coimbatore 641 048, India
[d] Department of Physics, Sri Shakthi Institute of Engineering and Technology, Coimbatore 641 062, India

Abstract The high level density functional theory, B3LYP, was proposed for the derivatives of energetic molecule Trinitrophenyl Nitramide [TNPN]: MTNPN, ETNPN and NETNPN respectively, in order to understand its explosive characteristics. The geometrical analysis has been studied from both the polarized, 6-311G** and augmented, aug-cc-pVDZ basis sets, and found consistency between the structural parameters. The bond strength of each molecule has been characterized from Bader's AIM analysis, thereby correlating the bond topological properties with the impact sensitivity, which predicts that C—NO$_2$ bonds were the weakest and found more sensitive among the rest of the bonds in all three molecules. The impact sensitivity of the molecules was measured in terms of $\Delta E_{LUMO-HOMO}$, OB$_{100}$, Q_{NO2}, h_{50}% and V_{mid}, revealed the high sensitive nature of NETNPN toward the external shock. The reaction surface of all the three molecules has been located from the isosurface of electrostatic potential.

CrossMark

Growth, vibrational, optical, thermal, magnetic and dielectric behavior of organo-metallic tetramethylammonium cadmium chloride crystal

N. Bhuvaneswari[1,2] · N. Priyadharsini[2] · S. Sivakumar[3] · K. Venkatachalam[4] · V. Siva[5]

Abstract

Single crystals of tetramethylammonium cadmium chloride were grown by slow evaporation technique. The single-crystal X-ray diffraction revealed that the crystal belongs to hexagonal crystal system with $P6_3/m$ space group. The crystalline nature of the grown crystal was measured by power X-ray diffraction. The presence of functional groups was identified using Fourier transform infrared and Fourier transform Raman studies. The optical absorption studies showed that the grown crystal transmit most of the incident radiation in the range of 200–800 nm. The diamagnetic property of the grown crystal has been analyzed by vibrating sample magnetometer. The mechanical stability of crystal is analyzed by Vickers microhardness study. Dielectric measurements were taken to analyze the dielectric constant and dielectric loss at different frequencies and temperatures. The thermal stability of grown crystals was confirmed by thermogravimetry/differential thermal analysis. Thermal stability of the compound was entered up to 208 °C.

Introduction

In recent years, the novel organic–inorganic hybrid materials have been widely used for data communication, sensing, spin-crossover and signal processing applications due to their desirable properties [1–4]. Hence, the growing of good single crystals of organic–inorganic materials is very much needed for variety of technical and economic developing this technology in various fields including electronic devices and electro-optical devices [5]. The single crystals have a wide range of applications such as harmonic frequency generators, optoelectronics, acoustic-optic modulators, magnetic devices, data storage devices, piezoelectric devices, holographic and laser devices [6, 7]. Crystals with general chemical formula $[N(CH_3)_4)]_2 MX_4$ belong to tetramethylammonium groups have A_2BX_4 type

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		Criterion III Metric 3.4.5

International Journal of **Molecular Sciences**

MDPI

Article

mACPpred: A Support Vector Machine-Based Meta-Predictor for Identification of Anticancer Peptides

Vinothini Boopathi [1], Sathiyamoorthy Subramaniyam [2,3], Adeel Malik [4], Gwang Lee [5,*], Balachandran Manavalan [5,*] and Deok-Chun Yang [1,*]

[1] Graduate School of Biotechnology, College of Life Science, Kyung Hee University, Yongin-si 17104, Gyeonggi-do, Korea; vinothini9327@gmail.com

[2] Research and Development Center, Insilicogen Inc., Yongin-si 16954, Gyeonggi-do, Korea; moorthy@insilicogen.com

[3] Department of Biotechnology, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu 641048, India

[4] Department of Microbiology and Molecular Biology, College of Bioscience and Biotechnology, Chungnam National University, Daejeon 34134, Korea; adeel@procarb.org

[5] Department of Physiology, Ajou University School of Medicine, Suwon 443380, Korea

* Correspondence: glee@ajou.ac.kr (G.L.); bala@ajou.ac.kr (B.M.); dcyang@khu.ac.kr (D.-C.Y.)

check for updates

Abstract: Anticancer peptides (ACPs) are promising therapeutic agents for targeting and killing cancer cells. The accurate prediction of ACPs from given peptide sequences remains as an open problem in the field of immunoinformatics. Recently, machine learning algorithms have emerged as a promising tool for helping experimental scientists predict ACPs. However, the performance of existing methods still needs to be improved. In this study, we present a novel approach for the accurate prediction of ACPs, which involves the following two steps: (i) We applied a two-step feature

Novel modified nano-activated carbon and its influence on the metal–O$_2$ battery system

Siva Palanisamy[a], Arunkumar Prabhakaran Shyma[a], Surendhiran Srinivasan[a], Rajendran Venkatachalam[a,b,*]

[a] Centre for Nano Science and Technology, K.S. Rangasamy College of Technology, Tiruchengode, 637 215, Tamil Nadu, India
[b] Centre for Nanoscience and Technology, Dr. N. G. P. Arts and Science College, Dr. N. G. P. Kalapatti Road, Coimbatore, 641048, Tamil Nadu, India

ARTICLE INFO

ABSTRACT

This investigation aims at the production of high graphitic, surface area, pore volume and microporous nano-activated carbon from a bioresource (i.e., palmyra palm nutshells) by direct carbonization using metallocene. The modified nano-activated carbon (MNAC) was obtained from the unmodified activated carbon (UMAC) through microwave-assisted sonication technique. The prepared UMAC and MNACs were comprehensively characterized to explore their properties such as surface area and pore volume. The Al-O$_2$ coin cell (2032) batteries were constructed using UMAC- and MNAC-coated copper mesh as an oxygen electrode, in three electrolytes. The electrolytes, namely gel (KOH-PVA), UMAC-gel, and MNAC-gel electrolytes, were used to explore the electrochemical performance of all the constructed Al-O$_2$ coin cell batteries. The electrochemical study of Al-O$_2$ coin cell batteries with MNAC as cathode in MNAC-gel electrolyte shows an enhanced performance than other two Al-O$_2$ coin cell batteries. The outcome of this study also indicates the possible use of MNACs into supercapacitors and other battery systems.

1. Introduction

medical facilities, and communication centers [6–9]

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ORIGINAL PAPER

CrossMark

Enhanced discharge capacity of Mg-air battery with addition of water dispersible nano MoS₂ sheet in MgCl₂ electrolyte

Arunkumar Prabhakaran Shyma[1] · Siva Palanisamy[1] · Naveenkumar Rajendhran[1] · Rajendran Venkatachalam[2]

Abstract
The aim of the present study is to increase the discharge capacity of Mg-air battery via electrolyte using water dispersible nano MoS_2 sheet as electrocatalyst since MoS_2 shows enhanced anodic behaviour. The nano MoS_2 sheet was effectively synthesised by polymer exfoliation technique employing ball milling and then converted into water dispersible form by adjusting its pH value above 10. The structure, morphology, crystallinity, particle size distribution and surface area of water dispersible nano MoS_2 (WDNMoS₂) were characterised comprehensively employing different characterisation techniques. A detailed analysis of corrosion, impedance and charge discharge performance of Mg-air battery were carried out with and without water dispersible nano MoS_2 (WDNMoS₂) in $MgCl_2$ electrolytes. The charge-discharge capacity of Mg-air battery is enhanced nearly 18% in case of addition of WDNMoS₂ (1170 mAh g^{-1}) to aqueous $MgCl_2$ electrolytes compared with aqueous $MgCl_2$ electrolyte (990 mAh g^{-1}).

Keywords Magnesium-air battery · Water dispersible MoS_2 · $MgCl_2$ electrolyte · Polymer exfoliation Heterogeneous electron transfer

Introduction

The metal-air battery is one of the most promising devices to meet global energy requirements due to their attracting multiple behaviours such as specific energy density, stable output voltage, energy efficiency, cost-effective and pollution-free mechanism. These metal air batteries are constructed with an anode made from pure metal and an external cathode of ambient air, mostly with an aqueous electrolyte. The electrochemical reaction that takes place in batteries is the oxidation of metal with oxygen from air [1, 2].

Mg-air batteries are considered as a potential candidate for the next generation of energy storage in metal air battery technology, due to their eco-friendly and anode recycling properties [3–5]. In addition, the Mg-air batteries are superior to

[6]. However, there are still many issues preventing the practical application of Mg-air batteries, including low practical capacity, short cycle life and corrosion. These issues related with Mg-air batteries can be addressed by the development of a suitable electrolyte and an enhanced oxygen electrode. Attempts have been made to enhance the performance of the Mg-air batteries employing different electrolyte additives like carbon allotropes [7].

The two dimensional chalcogenide materials like MoS_2, WS_2, etc., are widely given considerable attention in different fields, such as catalysis, solar cells, Li-ion battery and supercapacitor because of their intriguing properties. In recent years, the synthesised MoS_2 is used as a potential candidate in energy storage due to their physio-chemical properties like high surface area, thermal stability, catalytic activity etc. [8–17]. This

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Pharmacological activities of antroquinonol- Mini review

Venkatachalam Angamuthu[a,1], M. Shanmugavadivu[b,1], G. Nagarajan[c],
Bharath Kumar Velmurugan[d,*]

[a] Department of Supramolecular Chemistry and Catalysis, Shanghai University, PR China
[b] Department of Biotechnology, Dr. N. G. P. Arts and Science College, Coimbatore, India
[c] Faculty of Biology, Preparatory Year Deanship, King Faisal University, Al Hofuf, Saudi Arabia
[d] Toxicology and Biomedicine Research Group, Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

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ABSTRACT

Antrodia camphorata is an expensive mushroom that grows on the inner cavity of an endangered native tree of Taiwan namely Cinnamomum kanehirai Hayata. It is used as a traditional medicine in Taiwan and has several health benefits including free radical scavenging, anti-inflammatory, antimicrobial, hepatoprotective, neuroprotective, antidiabetic, and free radical-induced DNA damage protecting activities. Antroquinonol is a tetra-hydro ubiquinone derivative found predominantly in the mycelium of Antrodia camphorata, and is characterized by numerous biological and pharmacological activities. Several studies have revealed potential anticancer effects of antroquinonol in various carcinogenic models. Moreover, a phase II clinical trial is ongoing in the US and Taiwan to treat the lung cancer patients with this active compound. The present review aims at depicting a detailed view of the synthetic procedures of antroquinonol as well as deciphering its potential health benefits with a special emphasis on anticancer properties.

1. Introduction

Phytotherapy or use of traditional plant medicines in treating various detrimental diseases including cancer is gaining importance as a science-based alternative to the conventional pharmaceuticals [1]. Considering much less side-effects of plant extracts, many studies have been done, and are actively continuing, to identify, isolate, and analyze the potential health benefits of active plant compounds in the context of their implementation in healthcare settings [2].

Antrodia camphorata is an expensive mushroom that grows on the inner cavity of an endangered native tree of Taiwan namely Cinnamomum kanehirai Hayata (Lauraceae) [3]. Over many decades, Antrodia camphorata has been used as a traditional medicine in Taiwan

compounds that include terpenoids, benzenoids, lignans, benzoquinone derivatives, succinic and maleic derivatives, polysaccharides, sterols, nucleotides, fatty acids, and so on (Table 1) [3]. The majority of active compounds found primarily in the fruiting bodies of Antrodia camphorata are terpenoids, and many studies have been done to evaluate the biological and pharmacological properties of this particular group of compounds [9,10]. Of these properties, anti-cancer and anti-inflammatory effects of terpenoids are well-characterized in the literature [9,11–13]. However, despite many health benefits, large-scale production of these compounds as natural medicines is difficult due to very slow natural growth rate and host specificity of fruiting bodies. These peculiar characteristics of fruiting bodies demand for identifying other compounds that are abundant in the mycelium, and can be produced in

Passive and Active Control on 3D Convective Flow of Viscoelastic Nanofluid With Heat Generation and Convective Heating

S. Eswaramoorthi[1] and M. Bhuvaneswari[2*]

[1] Department of Mathematics, Dr. N.G.P. Arts and Science College, Coimbatore, India, [2] Department of Mathematics, Kongunadu Polytechnic College, Dindigul, India

The present article addresses the impact of passive control (PC) and active control (AC) on 3D flow of a viscoelastic nanofluid upon a stretching plate including heat generation and convective heating. The system of appearing non-linear PDE's are converted into a couple of ODE's by using suitable similarity transformations. Convergent series solutions are derived using the homotopy analysis method (HAM). Graphical results of velocity, nanoparticle volume fraction and temperature of different pertinent physical parameters with notable discussions are mentioned along with their physical significance.

Keywords: viscoelastic nanofluid, heat generation, passive/active control, convective heating, convection, stretching plate, HAM

1. INTRODUCTION

Fluids are much used to transfer heat in heat transfer equipment in industrial and engineering processes. Such processes are die casting, catalysis, distillation, synthesis in petrochemical industry, gas processing, hot-mix paving in concrete industry and steam generators in industrial laundry. In the above applications, thermal conductivity plays a vital role in heat transfer equipment. Conventional heat transfer of ordinary fluids, like water and oil, have low thermal conductivity, and poor heat transfer characters. The nanofluid is an advanced type of fluid incorporating nanometer-sized particles. This fluid is more stable, has high thermal conductivity, high mobility, a larger heat transfer surface between particles and fluids, low pumping power compared with ordinary fluids, low particle clogging, and low volume concentrations. Ahmed et al (2014) addressed the uncertainties of dynamic viscosity and thermal conductivity of nanofluid flow in a permeable stretching tube under the influence of a heat sink/source. They proved that the skin

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Research Article

Antimicrobial efficacy of fresh and dried banana peel extracts: An *in vitro* study

V. Kavitha[1*], G. Manonmani[2], J. Devakumar[3]

ABSTRACT

Background: Banana is one of the valuable sources for maintaining human health. The use of fresh banana peel extracts for antimicrobial properties can be of great significance in therapeutic treatments. **Objective:** This study aimed to evaluate the antibacterial activity of both fresh and dried various banana peel extracts. **Materials and Methods:** Alcoholic extract of banana peel extracts was subjected to antibacterial efficacy against Gram-positive and Gram-negative bacteria by the well agar diffusion method. **Results:** The alcoholic extract of fresh and dried banana peel showed a various inhibitory effect against various microbial isolates. Highest inhibitory effects were observed on Nendran and Poovan against *Staphylococcus aureus* (13.55 ± 0.04), *Bacillus subtilis* (13.26 ± 0.02), and *Pseudomonas aeruginosa* (14.5 ± 0.00). **Conclusion:** Alcoholic peel extracts of fresh and dried banana could be considered as a good antibacterial agent against both Gram-positive and Gram-negative bacteria.

KEY WORDS: Alcoholic banana peel extract, Banana, Gram-positive and Gram-negative bacteria, Well agar diffusion

INTRODUCTION

Nowadays, screening of alternate effective and safe medicine from potential medicinal plants is led by the increasing antibiotic-resistant microbial infectious agent. The phytometabolites have great potential to inhibit bacteria, fungi, and virus. Various parts of the plant such as bulb, gel, leaves, roots, barks, and peels were used for the extraction of phytometabolites.[1] The current practice of medicine today has changed a lot from its practice in medieval times. However, in India, we still use traditional practice for the treatment of various diseases since the Vedic period.[2]

Banana, one of the tropical fruits belonging to Musaceae family, is grown in many regions of all over the world.[3] All parts of the banana plant such as flower, pulp, stem, and leaves have a medicinal application.[4] The flowers in bronchitis and dysentery and on ulcers; cooked flowers are given to diabetics; the astringent

hemorrhages, acute dysentery, and diarrhea, and it is applied to hemorrhoids, insect and other stings, and bites; young leaves are placed as poultices on burns and other skin afflictions; the astringent ashes of the unripe peel and of the leaves are taken in dysentery and diarrhea and used for treating malignant ulcers;[5] the roots are administered in digestive disorders, dysentery, and other ailments; banana seed mucilage is given in cases of diarrhea in India.[6]

The previous studies have shown that waste material of banana peel has medicinal properties.[4,7] Various bioactive compounds such as flavonoids, tannins, phlobatannins, alkaloids, glycosides, and terpenoids are present in banana peel which exerts a pharmacological effect, especially as an antioxidant, antidiabetic, anti-inflammatory, and antibiotic.[7] Phytocompounds extracted from various parts of the banana plant in which exhibited significant inhibitory effect toward the foodborne pathogens; hence, banana plant should

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Efficient Feature Extraction and Sparse Reduction Using Enhanced Bat Optimization with Support Vector Machine Algorithm for Facial Expression Recognition

← Bac

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P. Dinesh Kumar and Dr.B. Rosiline Jeetha

Abstract

Expressions displayed by the face plays a significant task in human-to-human communication, enabling persons to articulate themselves further than the verbal world and comprehend each other from a variety of modes. A few expressions provoke human activities, and others develop the semantics of human interaction. This presented piece of work expresses strong Facial Expression Recognition (FER) scheme that can be utilized for improved human machine communication. Even though facial expression examination has been carried out on by several researchers, still there are a range of issues to be taken care of like noise owing to illumination variations over point in time and sparse reduction of features. Also, depth images must solve some of the privacy issues as actual identity of a product user can be concealed. The correctness of an FER system relies more on the mining and sparse reduction of robust features. This proposed method is a novel one which is Enhanced Bat Optimization with Support Vector Machine (EBOSVM) technique to obtain prominent features on faces and lessening of sparse spaces for competent training and recognition. To begin with the noises in the pictures are decreased by utilizing the Autoregressive Moving Average (ARMA) model. It is employed to perk up the FER accurateness by decreasing the noises considerably. Afterward hybrid Local Directional Patterns (HLDP) and Local Binary Patterns (LBPs) are acquired from the images. Lastly every pixel in the image with indication of a few top strength are set to symbolize unique and also robust face

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Optimized Random Forest Techniques To Improve The Resource Allocation Scheme In Cognitive Radio Networks

👤 M.Kannan *, Dr.B.Rosiline Jeetha

Abstract

In cognitive radio networks (CRNs), improving system utility and ensuring system fairness are two important issues. In this paper, we propose a spectrum allocation model to construct CRNs based on graph coloring theory, which contains three classes of matrices: available matrix, utility matrix, and interference matrix. Based on the model, we formulate a system objective function by jointly considering two features: system utility and system fairness. Based on the proposed model and the objective problem, we develop an improved gravitational search algorithm (IGSA) from two aspects: first, we introduce the pattern search algorithm (PSA) to improve the global optimization ability of the original gravitational search algorithm (GSA); second, we design the Chebyshev chaotic sequences to enhance the convergence speed and precision of the algorithm. Simulation results demonstrate that the proposed algorithm achieves

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Numerical Study on the Effect of Angle of Inclination on Magnetoconvection Inside Enclosure with Heat Generating Solid Body

P. Umadevi [1*], N. Nithyadevi [2], H. F. Oztop [3]

Affiliations

1. Dr. NGP Arts and Science College, Department of Mathematics, Tamilnadu, India

2. Bharathiar University, Department of Mathematics, Tamilnadu, India

3. Firat University, Department of Mechanical Engineering, Turkey

Abstract

Convective ow and heat transfer of uid inside a square en- closure having heat generating solid body, with various thermal boundary conditions is investigated numerically. The top wall of the enclosure is adiabatic, both the bottom and right walls are kept at constant temper- ature, while the left wall is heated using sin function. Numerical simu- lations is carried out by solving the governing equations using SIMPLE algorithm by means of the nite-volume method with power-law scheme. The important parameters focused are angle of inclination of the enclo- sure, area ratio of solid-enclosure, Hartmann number and temperature dierence ratio of solid- uid, which are ranges 0^0 - 90^0, 0.0625 - 0.5625, 0 - 100 and 0 - 50, respectively. Thermal conductivity ratio of solid- uid is xed as 5 and Rayleigh number as 10^5.

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Routine Correspondence Method with Grey Wolf Optimization based Imperforate Support Vector Machine Classifier (ISVMC) for High Dimensional Datasets

👤 M. Praveena and Dr.V. Jaiganesh

Abstract

With the recent prevalence of machine learning and data mining, significant effort is being made to push the frontier by which computers can assist humans in deriving insights and in making decisions through the analysis of a multitude of increasingly complex as well as heterogeneous datasets. Support Vector Machines (SVMs) is a type of data driven machine learning approach that deals with predictive classification. Using a large set of observations with known labels (training set), SVM finds a maximum margin function that separates the observations into two or more classes where each observation is a point in a multidimensional space of feature measurements. New unlabeled data are then assigned a class based on their geometric position relative to the classifier function. Given the vast amount of complex features that modern systems use, finding the classifier function often requires the simplification of the features space by identifying the dimensions that have the most distinguishing power. It is therefore essential to jointly optimize the feature selection and the classification in order to ensure the best performance. In this part of research work, Routine Correspondence Method with Grey Wolf Optimization based Imperforate Support Vector Machine Classifier (ISVMC) for High Dimensional Datasets is presented.

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CDARGA: Cluster-Based Data Aggregation with Genetic Routing Algorithm in Wireless Sensor Networks

R. Kowsalya, B. Rosiline Jeetha

Abstract: In the wireless sensor networks (WSNs), the upholding the energy and routing formation at every sensor node is the major issues. The distance from base station and internal node mainly has imbalanced in the energy consumption during transformation of the data. To reduce the energy upholding and the data aggregation routing issues in Centralized Clustering-Task Scheduling for wireless sensor networks (WSNs), this paper focuses on a Cluster-Based Data Aggregation Routing with Genetic search Algorithm (CDARGA) , which reduces the energy consumption in a hyper round model. The proposed data aggregation routing protocol using the Genetic Algorithm (GA) estimates the fitness function using the three key parameters distance, energy, and Hyper round policy. The proposed methods were compared with RP-MAC and the experimental result shows that the proposed protocol is superior to RP-MAC protocol and the proposed algorithm improves the network lifetime which can used in real time application.

Keywords: Centralized Clustering, Data Aggregation, Genetic Algorithm, Hyper round policy.

I. INTRODUCTION

A Wireless Sensor Network (WSN) is a cluster of sensor with small, lightweight, low computational capacity sensor nodes [1]. WSNs can be installed in uphold of a selection of different applications such as examining environmental occurrence (e.g., the stage of air pollution, weather monitoring). The information gathered from every sensor nodes is forwarded to a base-station for additional processing. The power conservation is significant measure for WSN

The more advance that is cluster-based networks are an important for atmosphere monitoring. To utilize each sensor nodes in cluster based network, it decreases communication distance for huge amount of sensor nodes, challenging only little nodes to broadcast long distances, e.g., Base Station (BS). A cluster-based procedure splits the network into a quantity of clusters. Every cluster has a Cluster Heads (CHs) with the intention of gathers data as of all associate nodes in its cluster.

These CHs aggregate the accumulated data and transmit it to the BS. This approach strongly decreases the message rate of the sensor nodes so that the duration of the network really expands. The major issues with WSN are that is needed to boost the duration of network. Commonly, duration of network is distinct as the time when the primary node is unsuccessful to transmit the packets or messages to the base station. This problem can be determined by executing data aggregation method as it reduces data traffic and additional saves energy by merging numerous incoming packets into a particular packet whenever the sensed information are extremely correlated [2]. Many researchers have been accepted out to additional level network lifetime.

In data aggregation the sensor network is frequently supposed as repeal multicast tree. During this process, sink request the sensor nodes to details ambient provision of occurrence. In this procedure, normally the information that is coming from numerous sensor nodes are aggregated, in such that the similar attribute of occurrence once it attain the equivalent routing node on mode back to sink.

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Antioxidant Potential and Antitumour Activities of *Nendran* Banana Peels in Breast Cancer Cell Line

P. S. KUMAR*, S. DURGADEVI¹, A. SARAVANAN AND S. UMA

ICAR-National Research Centre for Banana, Trichy-620 102, ¹Dr. N. G. P. Arts and Science College, Coimbatore-620 148, India

Kumar *et al.*: Anticancer activity of Banana peel

The present study was aimed to evaluate the antioxidant and antitumor activities of the aqueous methanol extract of *Nendran* banana peel as a valuable source for bioactive compounds against cancer. Free radical scavenging activity of the peel extracts was evaluated using 1,1-diphenyl-2-picrylhydrazyl and ferric reducing antioxidant power assay. The antitumor activity on MCF-7 breast cancer cell line was determined by the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide and ethidium bromide/acridine orange staining assay. Extract of banana peel was more efficient in reducing ferric ion with the increase in concentration and exhibited IC_{50} 180.33 µg/ml, free radical inhibition activity under 2,2-diphenyl-1-picrylhydrazyl hydrate assay. Flavonoid content was high (51.47 µg/ml) in the peel extract, which could have contributed to the antioxidant activity. The antioxidant enzyme concentration such as ascorbate peroxidase, catalase, peroxidase and superoxide dismutase were found higher in the fruit pulp than peel. As the concentration of extract increased from 20 to 200 µg/ml, the cell viability of MCF-7 decreased from 91.14 to 24.7 %. The IC_{50} values of plant extract-treated cells (120.6 µg/ml) showed typical apoptotic and necrotic morphological features such as condensed nuclei, membrane blebbing and formation of apoptotic bodies. This indicated the efficiency of sample against breast cancer with the highest inhibition of growth.

Key words: *Nendran* banana peel, bioactive compounds, apoptotic index, phenols, flavonoids, antioxidant

Cancer is a hyper-proliferative disorder, which involves transformation, deregulation of apoptosis, proliferation, invasion, angiogenesis, and metastasis. Worldwide, more than half a million people died of cancer every year, at a rate of 1500 patients every day[1]. Breast cancer is the second leading cancer in women, accounting for 25 % of all cases[2]. Currently tamoxifen, selective oestrogen receptor modulator, is widely used in the prevention and treatment of oestrogen receptor positive breast cancer[3]. However, a significant number of patients develop tamoxifen resistance and experience severe side effects[4,5]. It is therefore, imperative to search for newer compounds, which are effective, greener and not with many side

received significant attention due to their diverse pharmacological properties and cancer preventive effects. With the presence of flavonoids, alkaloids and terpenes, these offer different forms of cytotoxic effects such as cell proliferation inhibition, apoptosis induction or modulating signal transduction, without exhibiting considerable damage to normal cells[7-13]. These are relatively new, but very promising strategies in preventing cancer due to both additive and synergistic effects[8]. Interest in the pharmacological effects of bioactive compounds on cancer treatments and prevention has increased dramatically over the past 20 y. Many fruits such as guava[13], banana[11], papaya[12],

Research Paper

Cross-diffusion Effects on MHD Mixed Convection over a Stretching Surface in a Porous Medium with Chemical Reaction and Convective Condition

Marimuthu BHUVANESWARI[1], Sheniyappan ESWARAMOORTHI[2]

Sivanandam SIVASANKARAN[3], Ahmed Kadhim HUSSEIN[4]

[1] Department of Mathematics
Kongunadu Polytechnic College, D.Gudalur
Dindigul 624 620, Tamil Nadu, India

[2] Department of Mathematics
Dr.NGP Arts & Science College
Coimbatore 641048, Tamil Nadu, India

[3] Department of Mathematics, King Abdulaziz University
Jeddah 21589, Saudi Arabia
e-mail: sd.siva@yahoo.com

[4] Department of Mechanical Engineering, Babylon University
Babylon City, Iraq

In this paper, we investigate the Dufour and Soret effects on MHD mixed convection of a chemically reacting fluid over a stretching surface in a porous medium with convective boundary condition. The similarity transformation is used to reduce the governing non-linear partial differential equations into ordinary differential equations. Then, they are solved analytically by using the homotopy analysis method (HAM) and are solved numerically by the Runge-Kutta fourth-order method. The analytical and numerical results for the velocity, temperature, concentration, skin friction, Nusselt number and Sherwood number are discussed.

Key words: mixed convection; viscoelastic fluid; Dufour/Soret effect; magnetic field; chemical reaction.

Biological investigations of ruthenium(III) 3-(Benzothiazol-2-liminomethyl)-phenol Schiff base complexes bearing PPh₃ / AsPh₃ coligand

Sathiyaraj Subbaiyan[a*] and Indhumathi Ponnusamy[b]

[a]Department of Chemistry, Dr. N.G.P. Arts and Science College, Coimbatore - 641048, India
[b]Department of Chemistry, Shri Nehru Maha Vidyalaya College of Arts & Science, Coimbatore - 641050, India

ABSTRACT

New ruthenium(III) complexes with 3-(Benzothiazol-2-yliminomethyl)-phenol (HL) ligand have been synthesized and characterized with the aid of elemental analysis, IR, electronic, and electron paramagnetic resonance spectroscopic techniques. The binding mode of the ligand and complexes with DNA and their ability to bind DNA have been investigated by UV-vis absorption titration. In addition, the ligand and complexes have been subjected to antioxidant activity tests which showed that HL and its ruthenium(III) complexes possess significant scavenging effect against DPPH and OH radicals. Cytotoxic activities of the ligand and ruthenium(III) complexes showed that the ruthenium(III) complexes exhibited more effective cytotoxic activity against HeLa and MCF-7 cells than the corresponding ligand.

1. Introduction

It is familiar that medicinal inorganic chemistry is a multidisciplinary field combining elements of chemistry, pharmacology, toxicology and biochemistry. Transition metal complexes that are able of cleave DNA under physiological environment are of attention in the development of metal-based anticancer agents.[1-3] In this framework, platinum-based chemotherapy agents have been extensively used in the last 40 years in the treatment of various cancers.[4,5] Owed to the firm side effects that platinum-based agents reveal, interest in chemotherapeutic agents has shifted to non-platinum metal-based drugs. This is a thrust to inorganic chemists to extend inventive strategies for the preparation of more successful, less toxic, target specific and preferably non-covalently bound anticancer drugs. Many studies put forward that DNA is the chiefly intracellular target of antitumor drugs, because the interface between small molecules and DNA can cause DNA damage in cancer cells.[6,7] In the recent years, the delve into on ruthenium compounds in sight to their cytotoxic properties has augmented, motivated by the shows potential results previously obtained in both inorganic and organometallic fields where the cytotoxicity reported for some of the compounds is similar or even improved than that of cisplatin.[8] In addition, it has been confirmed that free radicals can damage lipids, proteins and DNA of bio-tissues

Cross Diffusion Effects on MHD Convection of Casson-Williamson Fluid over a Stretching Surface with Radiation and Chemical Reaction

M. Bhuvaneswari, S. Sivasankaran, H. Niranjan, and S. Eswaramoorthi

Abstract The thermal diffusion and diffusion-thermo effects on radiative mixed convective flow and heat transfer of Casson-Williamson fluid over a stretching surface are examined in the presence of uniform external magnetic field. The thermal radiation and chemical reaction effects are included in the study. This physical model is mathematically modelled by a set of nonlinear partial differential equations with boundary conditions. The governing system of equations is reformed into ordinary differential equations with the help of similarity variables, and then they are solved using homotopy analysis method. The concentration profile increases on increasing the dufour parameter, and the temperature profile increases on increasing the radiation parameter.

1 Introduction

The study of boundary layer flow of non-Newtonian fluids has anticipated significance in recent years because of its extensive applications in engineering discipline. Less number of studies on flow of non-Newtonian fluids is available due to more complex nature of such kind of flows which arise in the chemical processing industry, plastics processing industry, mining industry, lubrication, and biomedical flows [1–3]. Eswaramoorthi et al. [1] investigated the convective flow of viscoelastic fluid over a surface in the presence of radiation and chemical reaction. Rushi Kumar

M. Bhuvaneswari · S. Sivasankaran
Department of Mathematics, King Abdulaziz University, Jeddah, Saudi Arabia

H. Niranjan (✉)
Department of Mathematics, VIT University, Vellore, Tamil Nadu, India
e-mail: niranjan.hari@vit.ac.in

S. Eswaramoorthi

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A Mixture of Iodide Ion and Gum Exudates of *Eucalyptus globules* as Green Inhibitor for Dissolution Control of Mild Steel in 1 N HCl Medium

S. Dheenadhayalan, R. Rgia, V. Nijarubini and J. Mallika[1,*]

[1]Department of Chemistry, PSG College of Arts and Science, Coimbatore-641014, India
[2]Department of Chemistry, Dr. N.G.P. Arts and Science College, Coimbatore-641048, India

*Corresponding author: E-mail: jmchempsg@gmail.com

The mild steel dissolution in 1 N HCl medium was monitored in the presence and absence of gum exudates of *Eucalyptus globles* (GEG) using quantitative gravimetric method at 303-323 K. The synergistic influence of iodide ions with GEG on the dissolution of mild steel was also studied at 303-323 K. The impedance (R_t and C_d) and polarization (b_a, b_c, i_{corr}, E_{corr}) parameters were obtained from electrochemical methods for the optimum concentration of GEG and GEG + I$^-$. The dissolution of mild steel decreases with increase in the concentration of GEG and GEG + I$^-$ at 30 °C. But their inhibition ability of tested inhibitor system for dissolution control of mild steel decreases with increase in temperature but rate of dissolution of mild steel is comparatively less in the case of GEG + I$^-$. Adsorption of GEG on mild steel obeys Langmuir's isotherm and supports physisorption process. Tafel's parameters confirm the mixed nature of the studied inhibitor.

Keywords: *Eucalyptus globles*, Mild steel, Synergism, Physisorption, Langmuir isotherm.

INTRODUCTION

Carbohydrates obtained from plant and animal sources are biopolymers existing as products of biochemical processes of living system due to its non-toxic and eco friendly nature. Several investigators reported that the carboxymethyl and hydroxyethyl cellulose, starch, pectin and pectates, substituted/modified chitosans, currageenan, dextrin/cyclodextrins, alginates as green carbohydrate biopolymers for corrosion inhibition of various metal and their alloys in both acidic or alkaline or neutral environments [1]. This is because they are molecules with long chain carbon linkage having multiple adsorption sites and thus block large surface area of the corroding metal

inhibiting strength with macromolecules, biodegradability and eco friendly nature [2]. As a contribution to the current interest on environmental friendly, green, corrosion inhibitors, the present study investigates the gum exudates from *Eucalyptus globles* (GEG) as non-toxic green adhesive as well as inhibitor for dissolution control of mild steel in 1 N HCl using the gravimetric, Tafel's polarization and impedance measurements. The adhesive nature or binding capacity of GEG on mild steel in 1 N HCl is found to be less significant at higher temperature. Therefore the adsorption strength as well as corrosion inhibition effectiveness of GEG on mild steel surface can be synergistically enhanced using iodide ions which are good ligands

Effects of viscous dissipation and convective heating on convection flow of a second-grade liquid over a stretching surface: An analytical and numerical study

M. Bhuvaneswari[a], S. Eswaramoorthi[b], S. Sivasankaran[a,*], S. Rajan[c], and A. Saleh Alshomrani[a]

a. Department of Mathematics, King Abdulaziz University, Jeddah 21589, Saudi Arabia.
b. Department of Mathematics, Dr.N.G.P. Arts & Science College, Coimbatore 641048, Tamil Nadu, India.
c. Department of Mathematics, Erode Arts & Science College, Erode 638009, Tamil Nadu, India.

Abstract. The effects of viscous dissipation and convective boundary condition on the two-dimensional convective flow of a second-grade liquid over a stretchable surface with suction/injection and heat generation were investigated. The governing partial differential equations were reduced into a dimensionless coupled system of nonlinear ordinary differential equations by appropriate similarity transformation. Then, they were solved analytically by Homotopy Analysis Method (HAM) and numerically by fourth-order Runge-Kutta method with shooting technique. The HAM and numerical results of the local skin friction and local Nusselt number were compared for various emerging parameters. It was found that the momentum boundary layer thickness grew by raising the value of the viscoelastic parameter.

1. Introduction

The study of boundary layer flow of a viscoelastic liquid over a stretching surface plays a significant role in manufacturing processes including hot rolling, crystal growing, glass blowing, production of synthetic sheets, thermal insulation, thermal control of nuclear reactors, thermal oil recovery, film cooling, design of thrust

transfer is an important process in many technical and industrial applications such as drying, damage of crops because of freezing, food processing, removal of nuclear fuel debris, underground disposal of radioactive waste materials, etc. Because of these applications, several researchers engage with analyzing the heat transfer process in different physical contexts. Some of the important studies that underline such concept can be

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Growth, vibrational, optical, thermal, magnetic and dielectric behavior of organo-metallic tetramethylammonium cadmium chloride crystal

N. Bhuvaneswari[1,2] · N. Priyadharsini[2] · S. Sivakumar[3] · K. Venkatachalam[4] · V. Siva[5]

Abstract

Single crystals of tetramethylammonium cadmium chloride were grown by slow evaporation technique. The single-crystal X-ray diffraction revealed that the crystal belongs to hexagonal crystal system with $P6_3/m$ space group. The crystalline nature of the grown crystal was measured by power X-ray diffraction. The presence of functional groups was identified using Fourier transform infrared and Fourier transform Raman studies. The optical absorption studies showed that the grown crystal transmit most of the incident radiation in the range of 200–800 nm. The diamagnetic property of the grown crystal has been analyzed by vibrating sample magnetometer. The mechanical stability of crystal is analyzed by Vickers microhardness study. Dielectric measurements were taken to analyze the dielectric constant and dielectric loss at different frequencies and temperatures. The thermal stability of grown crystals was confirmed by thermogravimetry/differential thermal analysis. Thermal stability of the compound was entered up to 208 °C.

Keywords Organo-metallic crystal · Fourier transform infrared · Fourier transform Raman · Dielectric constant · Thermogravimetry/differential thermal analysis · Vibrating sample magnetometer

Introduction

developing this technology in various fields including electronic devices and electro-optical devices [5]. The

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Two Phase Content Based Image Retrieval with relevance ranking on classified images

Publisher: IEEE

Cite This

PDF

S. Sindu ; R. Kousalya   All Authors

Abstract

Document Sections

I. Introduction

II. Literature Survey

III. Content Based Image
Retrieval with Relevance
Ranking On Classified
Images

IV. Results and Discussions

V. Conclusion and Future
Scope

Authors

Abstract:
With the growing trend in mobile and computing devices, large number of digital images are generated in day to day life. These generated images are stored in databases for later use. As enormous quantity of digital images are stored in database there is a need for retrieving the relevant image. The content - based image recovery (CBIR) that manages the recovery of images from the large database is one of the applications of computer vision. Content - based image recovery is carried out in two phases in this research work. In the first phase Convolutional Neural Network(CNN) is used for detecting the images. CNN are capable of detecting multiple objects each belonging to different class by processing the image in a single pass. Convolution Neural Network is used to solve the multiple class detection problem. In the second phase once the objects are detected, relevant images are retrieved by using relevance ranking where priority is assigned within same class of images.

ORIGINAL ARTICLE

Explosives properties of high energetic trinitrophenyl nitramide molecules: A DFT and AIM analysis

CrossMark

V. Anbu [a,*], K.A. Vijayalakshmi [b,*], R. Karunathan [c], A. David Stephen [d], P.V. Nidhin [d]

[a] Research & Development Centre, Bharathiar University, Coimbatore 641 046, India
[b] Department of Physics, Sri Vasavi College, Erode 638 316, India
[c] Department of Physics, Dr. NGP Arts & Science College, Coimbatore 641 048, India
[d] Department of Physics, Sri Shakthi Institute of Engineering and Technology, Coimbatore 641 062, India

Abstract The high level density functional theory, B3LYP, was proposed for the derivatives of energetic molecule Trinitrophenyl Nitramide [TNPN]: MTNPN, ETNPN and NETNPN respectively, in order to understand its explosive characteristics. The geometrical analysis has been studied from both the polarized, 6-311G** and augmented, aug-cc-pVDZ basis sets, and found consistency between the structural parameters. The bond strength of each molecule has been characterized from Bader's AIM analysis, thereby correlating the bond topological properties with the impact sensitivity, which predicts that $C-NO_2$ bonds were the weakest and found more sensitive among the rest of the bonds in all three molecules. The impact sensitivity of the molecules was measured in terms of $\Delta E_{LUMO-HOMO}$, OB_{100}, Q_{NCO}, $h_{50}\%$ and V_{mid}, revealed the high sensitive nature of NETNPN toward the external shock. The reaction surface of all the three molecules has been located from the isosurface of electrostatic potential.

1. Introduction

The most important criteria for a high energy density material to be a good explosive candidate depend on its sensitivity toward the external shocks. The ability of the high energetic materials to release high amount of energy should be controlled by reducing the sensitivity.

* Corresponding authors.
E-mail addresses: v.anbuvee@gmail.com (V. Anbu), kavijayalakshmi@yahoo.co.in (K.A. Vijayalakshmi).

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ORIGINAL PAPER

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Enhanced discharge capacity of Mg-air battery with addition of water dispersible nano MoS_2 sheet in $MgCl_2$ electrolyte

Arunkumar Prabhakaran Shyma[1] · Siva Palanisamy[1] · Naveenkumar Rajendhran[1] · Rajendran Venkatachalam[2]

Abstract

The aim of the present study is to increase the discharge capacity of Mg-air battery via electrolyte using water dispersible nano MoS_2 sheet as electrocatalyst since MoS_2 shows enhanced anodic behaviour. The nano MoS_2 sheet was effectively synthesised by polymer exfoliation technique employing ball milling and then converted into water dispersible form by adjusting its pH value above 10. The structure, morphology, crystallinity, particle size distribution and surface area of water dispersible nano MoS_2 (WDNMoS2) were characterised comprehensively employing different characterisation techniques. A detailed analysis of corrosion, impedance and charge discharge performance of Mg-air battery were carried out with and without water dispersible nano MoS_2 (WDNMoS2) in $MgCl_2$ electrolytes. The charge-discharge capacity of Mg-air battery is enhanced nearly 18% in case of addition of WDNMoS2 (1170 mAh g^{-1}) to aqueous $MgCl_2$ electrolytes compared with aqueous $MgCl_2$ electrolyte (990 mAh g^{-1}).

Keywords Magnesium-air battery · Water dispersible MoS_2 · $MgCl_2$ electrolyte · Polymer exfoliation Heterogeneous electron transfer

Introduction

The metal-air battery is one of the most promising devices to meet global energy requirements due to their attracting multiple behaviours such as specific energy density, stable output voltage, energy efficiency, cost-effective and pollution-free mechanism. These metal air batteries are constructed with an anode made from pure metal and an external cathode of ambient air, mostly with an aqueous electrolyte. The electrochemical reaction that takes place in batteries is the oxidation of metal with oxygen from air [1, 2].

Mg-air batteries are considered as a potential candidate for

[6]. However, there are still many issues preventing the practical application of Mg-air batteries, including low practical capacity, short cycle life and corrosion. These issues related with Mg-air batteries can be addressed by the development of a suitable electrolyte and an enhanced oxygen electrode. Attempts have been made to enhance the performance of the Mg-air batteries employing different electrolyte additives like carbon allotropes [7].

The two dimensional chalcogenide materials like MoS_2, WS_2, etc., are widely given considerable attention in different fields, such as catalysis, solar cells, Li-ion battery and supercapacitor because of their intriguing properties. In recent

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Novel modified nano-activated carbon and its influence on the metal–O_2 battery system

Siva Palanisamy[a], Arunkumar Prabhakaran Shyma[a], Surendhiran Srinivasan[a],
Rajendran Venkatachalam[a,b,*]

[a] Centre for Nano Science and Technology, K.S. Rangasamy College of Technology, Tiruchengode, 637 215, Tamil Nadu, India
[b] Centre for Nanoscience and Technology, Dr. N. G. P. Arts and Science College, Dr. N. G. P. Kalapatti Road, Coimbatore, 641048, Tamil Nadu, India

ARTICLE INFO

ABSTRACT

This investigation aims at the production of high graphitic, surface area, pore volume and microporous nano-activated carbon from a bioresource (i.e., palmyra palm nutshells) by direct carbonization using metallocene. The modified nano-activated carbon (MNAC) was obtained from the unmodified activated carbon (UMAC) through microwave-assisted sonication technique. The prepared UMAC and MNACs were comprehensively characterized to explore their properties such as surface area and pore volume. The Al-O_2 coin cell (2032) batteries were constructed using UMAC- and MNAC-coated copper mesh as an oxygen electrode, in three electrolytes. The electrolytes, namely gel (KOH-PVA), UMAC-gel, and MNAC-gel electrolytes, were used to explore the electrochemical performance of all the constructed Al-O_2 coin cell batteries. The electrochemical study of Al-O_2 coin cell batteries with MNAC as cathode in MNAC-gel electrolyte shows an enhanced performance than other two Al-O_2 coin cell batteries. The outcome of this study also indicates the possible use of MNACs into supercapacitors and other battery systems.

1. Introduction

In recent years, the energy production and storage technology is moving toward green energy technology that produces less CO_2 emissions in order to overcome global warming [1]. Therefore, alternative energy production and storage techniques are badly required [2]. Batteries are one of the best alternative energy storage methods to resolve this issue [1–3]. Specifically, metal-air batteries have gained considerable attention in past few years because of their high energy capacity and power density [4,5].

Different types of metal-air batteries are available for a variety of applications. In the past decade or so, metal-air batteries have been progressively improved in terms of cost, size, energy and power densities, shell life, trustworthiness, and safety. High-capacity metal-air batteries are deployed in electrical vehicles and heavy electrical vehicles, commercial transportations, military aircraft, remote power installations, communication satellites, and other commercial applications. Portable metal-air batteries are widely used in battlefield applications and at remote military locations. Metal-air batteries can also provide temporary electrical power for mobile shelters, field medical facilities, and communication centers [6–9].

Metal-air batteries are known for their inherent advantages of mechanical replacement of the consumed anodes [10]. The most important aspect of metal-air batteries is the supply of oxygen gas through the cathode terminal. Hence, they require an open cell structure [11] and classified widely based on the metals used. Lithium-air batteries can deliver high performance in many industrial applications than other metal-air batteries. However, lithium is highly sensitive to atmospheric conditions such as humidity and oxygen concentrations [12]. Also, less availability and high cost of lithium limits its application as a cost-effective metal-air battery.

On the other hand, aluminum is an exuberant, cost-effective anode material for energy storage and conversion applications because of its high negative standard electrode potential and high specific capacity [13,14]. It can be easily recycled compared to any other metal for metal-air battery applications. Aluminum delivers a high theoretical energy density of 8046 mA h cm^{-2} compared with other metals [15]. In addition, aluminum anodes show a high theoretical cell voltage of 2.4 V [16]. Aqueous electrolytes are commonly used in metal-air batteries because they exhibit high ionic conductivities. Some of the main

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Enhanced Photovoltaic Performance of Hybrid Solar Cells with a Calcium Interfacial Metal Electrode

MURUGAN VINOTH,[1] SRINIVASAN SURENDHIRAN,[1] PEMMAN RATHINAM SENTHILMURUGAN,[1] and VENKATACHALAM RAJENDRAN[1,2,3,4]

1.—Centre for Nano Science and Technology, K. S. Rangasamy College of Technology, Tiruchengode, Tamil Nadu 637215, India. 2.—Centre for Nano Science and Technology, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu 641048, India. 3.—e-mail: veerajendran@gmail.com. 4.—e-mail: vrajendran@drngpasc.ac.in

A better understanding of how the interfacial layer influences charge carrier recombination would benefit the development of high-efficiency hybrid solar cells (HSCs). HSCs based on poly(3-hexylthiophene) (P3HT)/Si nanoparticles (Si NPs) with three identical electrodes were used as reference system to investigate the interfacial layer effects on device performance. The standard solar-grade silicon was produced using rice husk ash (RHA) as a biogenic source. The RHA was purified by using a low-cost and simple method followed by modified magnesiothermic reduction reaction to produce crystalline Si NPs. Prepared Si NPs as an acceptor material with different percentages of Ca interface layer metal electrodes on HSCs were studied. A highly conductive electrode was one of the important factors for enhancing the fill factor and power conversion efficiency (PCE). For fabrication and characterization of P3HT/Si NP HSCs with three identical thermally evaporated electrodes, Al (100 nm), Ca/Al (10 nm/90 nm), and Ca/Al (20 nm/80 nm) were used as top electrode. The device with a Ca/Al (10 nm/90 nm) electrode exhibited a lower recombination, while its efficiency was 20% and 10% higher than the devices with the Al (100 nm) and Ca/Al (20 nm/80 nm) electrodes, respectively.

Key words: Hybrid solar cells, interface, electrode, built-in field, charge recombination

INTRODUCTION

methods.[2-5] The methods used to produce high-

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Water-dispersible graphene–wrapped MnO$_2$ nanospheres and their applications in coin cell supercapacitors

Siva Palanisamy[1] · Arunkumar Prabhakaran Shyma[1] · Surendhiran Srinivasan[1] · Naveen kumar Rajendran[1] · Rajendran Venkatachalam[1,2]

Abstract

A highly stable and more water-dispersible graphene (WDG) was synthesized using microwave-assisted ball milling technique. The WDG-wrapped MnO$_2$ nanocomposites were prepared for two mass ratios of nanospheres and graphene sheets using reflux method. Comprehensive characterization of the prepared WDG-Mn1 and WDG-Mn2 hybrid nanocomposites was carried out to explore the electrochemical capacitance behaviors. The WDG-Mn1 and WDG-Mn2 electrodes showed capacitance performance of 130 F g^{-1} at 0.5 A g^{-1} and 178 F g^{-1} at 0.5 A g^{-1}, respectively. The WDG-Mn2 electrode revealed enhanced capacitance performance, that is, 84% of its initial capacitance was retained even after repeating the cyclic voltammetry test for 3000 cycles. This study reveals the enhanced capacity performance in WDG-Mn2 nanocomposite hybrid materials for supercapacitors.

Keywords Water-dispersible graphene · Coin cell · Supercapacitor · Gel electrolyte · Charge–discharge

Introduction

Supercapacitors have gained significant importance worldwide due to their higher power density, excellent reversibility, and long cycle life than batteries. Owing to high power performance, long life cycle, and low maintenance cost, supercapacitors are believed to be a potential candidate for energy storage applications [1–7]. Extensive research on the development of different electrode materials such as conductive polymer [8], transition metal oxide [9], and various forms of carbon [10] has been gaining importance. Among various forms of carbon such as graphite, carbon black, and CNT, graphene is the most promising material that finds extensive storage applications due to its unique properties, such as

superior electrical conductivity, and high thermal and chemical stability [11].

Many methods such as Hummers' [2, 12] electrochemical [13] and polymer exfoliation [14, 15] are used to synthesize graphene from graphite oxide (GO). The traditional synthesis methods of graphene yield less quantity and higher chemical wastage. In general, graphene shows a restacking effect; it is difficult to anchor metal oxides with graphene [16]. The water-dispersible/soluble form of graphene might reduce the restacking of graphene and hence it enables the anchorage with metal oxides. The water-dispersible graphene (WDG) can be easily dispersed in a metal oxide precursor solution to obtain enhanced properties. Further, WDG has a crucial role as a catalyst in metal-air battery [17].
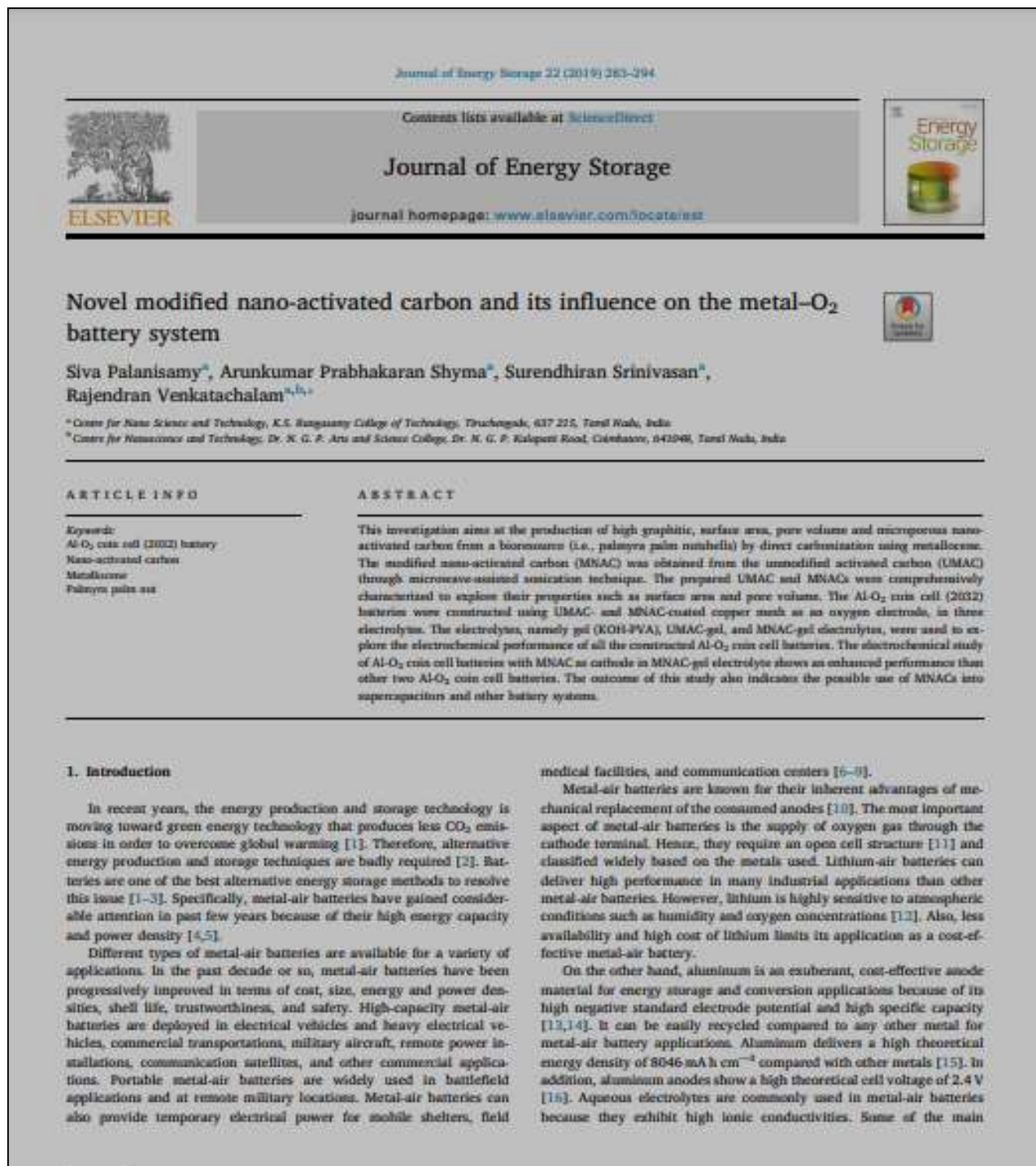
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Influence of nanoflower $FeTiO_3$ in carbon dioxide reduction

Siva Palanisamy, Surendhiran Srinivasan, Arunkumar Prabhakaran Shyma, Naveenkumar Rajendhran, Karthik Subramani, Vinoth Murugan & Rajendran Venkatachalam ✉

Abstract

The effect of electrochemical reduction of carbon dioxide (CO_2) by changing the structure and morphology of $FeTiO_3$ nanoparticle prepared through sol–gel and hydrothermal methods is explained in this study. $FeTiO_3$ nanoparticles were used as a cathode where as a stainless steel plate and CO_2^- saturated $NaHCO_3$ were used as an anode and an electrolyte, respectively. The cyclic voltammetry and linear sweep voltammetry analysis were carried out comprehensively on $FeTiO_3$-SG-and $FeTiO_3$-HT-coated electrodes to decouple the electrochemical reduction processes of CO_2 in aqueous solution. The charge transfer resistance and the product gases were studied using electrochemical impedance spectroscopy and gas chromatography,

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Passive and Active Control on 3D Convective Flow of Viscoelastic Nanofluid With Heat Generation and Convective Heating

S. Eswaramoorthi[1] and M. Bhuvaneswari[2*]

[1] Department of Mathematics, Dr. N.G.P. Arts and Science College, Coimbatore, India, [2] Department of Mathematics, Kongunadu Polytechnic College, Dindigul, India

The present article addresses the impact of passive control (PC) and active control (AC) on 3D flow of a viscoelastic nanofluid upon a stretching plate including heat generation and convective heating. The system of appearing non-linear PDE's are converted into a couple of ODE's by using suitable similarity transformations. Convergent series solutions are derived using the homotopy analysis method (HAM). Graphical results of velocity, nanoparticle volume fraction and temperature of different pertinent physical parameters with notable discussions are mentioned along with their physical significance.

Keywords: viscoelastic nanofluid, heat generation, passive/active control, convective heating, convection, stretching plate, HAM

1. INTRODUCTION

Fluids are much used to transfer heat in heat transfer equipment in industrial and engineering processes. Such processes are die casting, catalysis, distillation, synthesis in petrochemical industry, gas processing, hot mix paving in concrete industry and steam generators in industrial laundry. In the above applications, thermal conductivity plays a vital role in heat transfer equipment. Conventional heat transfer of ordinary fluids, like water and oil, have low thermal conductivity, and poor heat transfer characters. The nanofluid is an advanced type of fluid incorporating nanometer-sized particles. This fluid is more stable, has high thermal conductivity, high mobility, a larger heat transfer surface between particles and fluids, low pumping power compared with ordinary fluids, low particle clogging, and low volume concentrations. Ahmed et al. (2014) addressed the uncertainties of dynamic viscosity and thermal conductivity of nanofluid flow in a permeable stretching tube under the influence of a heat sink/source. They proved that the skin friction coefficient of Ag–water nanofluid is smaller compared to the TiO₂ nanofluid. The dual solutions of nanofluid flow past a moving semi-infinite flat plate are derived by Bachok et al. (2010), who found that a smaller heat transfer rate occurs in higher values of the Prandtl number. Khan and Pop (2010) explored the impact of Brownian motion and thermophoresis on a nanofluid flow in a flat surface. It is seen that Brownian motion suppresses the reduced Nusselt number and strengthens the reduced Sherwood number. The impact of Brownian motion and thermophoresis of nanofluid fluid flow between two parallel plates was recently investigated by Derakhshan et al.

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──────── Research Paper ────────

Antioxidant Potential and Antitumour Activities of *Nendran* Banana Peels in Breast Cancer Cell Line

P.S. KUMAR*, S. DURGADEVI, A. SARAVANAN AND S. UMA

ICAR-National Research Centre for Banana, Trichy-620 102, ¹Dr. N. G. P. Arts and Science College, Coimbatore-620 148, India

Kumar *et al.*: Anticancer activity of Banana peel

The present study was aimed to evaluate the antioxidant and antitumor activities of the aqueous methanol extract of *Nendran* banana peel as a valuable source for bioactive compounds against cancer. Free radical scavenging activity of the peel extracts was evaluated using 1,1-diphenyl-2-picrylhydrazyl and ferric reducing antioxidant power assay. The antitumor activity on MCF-7 breast cancer cell line was determined by the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide and ethidium bromide/acridine orange staining assay. Extract of banana peel was more efficient in reducing ferric ion with the increase in concentration and exhibited IC_{50} 180.33 µg/ml, free radical inhibition activity under 2,2-diphenyl-1-picrylhydrazyl hydrate assay. Flavonoid content was high (51.47 µg/ml) in the peel extract, which could have contributed to the antioxidant activity. The antioxidant enzyme concentration such as ascorbate peroxidase, catalase, peroxidase and superoxide dismutase were found higher in the fruit pulp than peel. As the concentration of extract increased from 20 to 200 µg/ml, the cell viability of MCF-7 decreased from 91.14 to 24.7 %. The IC_{50} values of plant extract-treated cells (120.6 µg/ml) showed typical apoptotic and necrotic morphological features such as condensed nuclei, membrane blebbing and formation of apoptotic bodies. This indicated the efficiency of sample against breast cancer with the highest inhibition of growth.

Key words: *Nendran* banana peel, bioactive compounds, apoptotic index, phenols, flavonoids, antioxidant

Cancer is a hyper-proliferative disorder, which involves transformation, deregulation of apoptosis, proliferation, invasion, angiogenesis, and metastasis. Worldwide, more than half a million people died of cancer every year, at a rate of 1500 patients every day[1]. Breast cancer is the second leading cancer in women, accounting for 25 % of all cases[2]. Currently tamoxifen, selective oestrogen receptor modulator, is widely used in the prevention and treatment of oestrogen receptor positive breast cancer[3]. However, a significant number of patients develop tamoxifen resistance and experience severe side effects[4,5]. It is therefore, imperative to search for newer compounds, which are effective, greener and not with many side effects.

As the conventional cancer therapies failed to fulfil the criteria for successful cancer treatments, recent research revolved around the urgency to develop suitable therapy for the cure of cancer with no toxic received significant attention due to their diverse pharmacological properties and cancer preventive effects. With the presence of flavonoids, alkaloids and terpenes, these offer different forms of cytotoxic effects such as cell proliferation inhibition, apoptosis induction or modulating signal transduction, without exhibiting considerable damage to normal cells[7-13]. These are relatively new, but very promising strategies in preventing cancer due to both additive and synergistic effects[9]. Interest in the pharmacological effects of bioactive compounds on cancer treatments and prevention has increased dramatically over the past 20 y. Many fruits such as guava[11], banana[11], papaya[12], lemon[14], orange[15], apple, water melon, litchi are reported to possess proven medicinal activities when

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Stabilization of tetragonal zirconia in alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites: A comparative structural analysis

A. Karthik[a], S.R. Srither[a], N.R. Dhineshbabu[a], N. Lenin[a], S. Arunmetha[a], P. Manivasakan[a], V. Rajendran[a,b,*]

[a] Centre for Nano Science and Technology, K. S. Rangasamy College of Technology, Tiruchengode, 637 215, Tamil Nadu, India
[b] Centre for Research, Dr. N G P Arts and Science College, Coimbatore, 641048, Tamil Nadu, India

ARTICLE INFO

ABSTRACT

Mass production of alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites powder was prepared from nitrate precursors using an automated hot-air spray pyrolysis technique. The microstructural characteristics of nanocomposites were comprehensively analyzed. X-ray diffraction patterns showed that completely a tetragonal-zirconia phase was stabilized in the nanocomposites at elevated temperature. The average crystallite size for the corresponding nanocomposites powder was measured respectively in the range of 6-65 and 10-47 nm. The produced large quantity of nanopowder was discovered as controlled particle size (d_{50}) of 30 nm, spherical shape, and free flowing structure had a surface area of 61 m^2g^{-1}. Further, their structural phase identification and its transformation were correlated through thermal analyzer and diffraction pattern. The interpretation for an increase in hardness and decrease in elastic modulus values of nanocomposites was witnessed at a wide range of calcination. Finally, the t-ZrO_2 toughened nanocomposites was retained their overall specific properties and same will be more viable for various industrial applications.

1. Introduction

Multiphase nanocomposites have attracted in interdisciplinary research area due to the existence of exotic properties that are different from their bulk materials. The properties of nanomaterials are depending purely on parameters such as particle size, shape, and structural phase and its homogeneity [1–7]. In recent years, the preparation of metal oxide nanocomposites in both amorphous and crystalline nature is fascinated towards the various multidisciplinary requirements [8–10]. Thus, the multiphase nanoceramics are extensively used as a coating material in problem-oriented upper-surface-protective coatings

correspondingly in A-Z and A-YSZ nanocomposite and hence, mainly to retain its tetragonal zirconia (t-ZrO_2) phase [19–22].

Thus, the structural stabilization of t-ZrO_2 in A-Z and A-YSZ nanocomposites at high temperature is mainly influenced by a stabilizing agent and its critical size effect [8,9]. Further, the stabilizing agent has a capability to inhibit the phase transformation from tetragonal zirconia to monoclinic zirconia (m-ZrO_2) [21,23]. Therefore, to achieve a stable structural phase of t-ZrO_2, it is essentially focused on different volume ratio of alumina, zirconia, and yttria compound [24–27]. The ratio of compound like zirconia (30–40 wt %), alumina (60–70 wt %) and yttria (3–9 wt %) content used here are contributed to retain the t-ZrO_2 phase

Stabilization of tetragonal zirconia in alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites: A comparative structural analysis

A. Karthik[a], S.R. Srither[a], N.R. Dhineshbabu[a], N. Lenin[a], S. Arunmetha[a], P. Manivasakan[a], V. Rajendran[a,b,*]

[a] Centre for Nano Science and Technology, K. S. Rangasamy College of Technology, Tiruchengode, 637 215, Tamil Nadu, India
[b] Centre for Research, Dr. N G P Arts and Science College, Coimbatore, 641048, Tamil Nadu, India

ARTICLE INFO

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Al_2O_3–(Y_2O_3)ZrO_2
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Crystalline size effect
Electron microscopy
Elastic properties

ABSTRACT

Mass production of alumina-zirconia and alumina-yttria stabilized zirconia nanocomposites powder was prepared from nitrate precursors using an automated hot-air spray pyrolysis technique. The microstructural characteristics of nanocomposites were comprehensively analyzed. X-ray diffraction patterns showed that completely a tetragonal-zirconia phase was stabilized in the nanocomposites at elevated temperature. The average crystallite size for the corresponding nanocomposites powder was measured respectively in the range of 6–65 and 10–47 nm. The produced large quantity of nanopowder was discovered as controlled particle size (d_{50}) of 30 nm, spherical shape, and free flowing structure had a surface area of 61 m^2g^{-1}. Further, their structural phase identification and its transformation were correlated through thermal analyzer and diffraction pattern. The interpretation for an increase in hardness and decrease in elastic modulus values of nanocomposites was witnessed at a wide range of calcination. Finally, the t-ZrO_2 toughened nanocomposites was retained their overall specific properties and same will be more viable for various industrial applications.

1. Introduction

Multiphase nanocomposites have attracted in interdisciplinary research area due to the existence of exotic properties that are different from their bulk materials. The properties of nanomaterials are depending purely on parameters such as particle size, shape, and structural phase and its homogeneity [1–7]. In recent years, the preparation of metal oxide nanocomposites in both amorphous and crystalline nature is fascinated towards the various multidisciplinary requirements [8–10]. Thus, the multiphase nanoceramics are extensively used as a coating material in problem-oriented upper-surface-protective coatings

correspondingly in A-Z and A-YSZ nanocomposite and hence, mainly to retain its tetragonal zirconia (t-ZrO_2) phase [19–22].

Thus, the structural stabilization of t-ZrO_2 in A-Z and A-YSZ nanocomposites at high temperature is mainly influenced by a stabilizing agent and its critical size effect [8,9]. Further, the stabilizing agent has a capability to inhibit the phase transformation from tetragonal zirconia to monoclinic zirconia (m-ZrO_2) [21,23]. Therefore, to achieve a stable structural phase of t-ZrO_2, it is essentially focused on different volume ratio of alumina, zirconia, and yttria compound [24–27]. The ratio of compound like zirconia (30–40 wt %), alumina (60–70 wt %) and yttria (3–9 wt %) content used here are contributed to retain the t-ZrO_2 phase

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Pharmacological activities of antroquinonol- Mini review

Venkatachalam Angamuthu[a,1], M. Shanmugavadivu[b,1], G. Nagarajan[c],
Bharath Kumar Velmurugan[d,*]

[a] Department of Supramolecular Chemistry and Catalysis, Shanghai University, PR China
[b] Department of Biotechnology, Dr. N. G. P. Arts and Science College, Coimbatore, India
[c] Faculty of Biology, Preparatory Year Deanship, King Faisal University, Al Hofuf, Saudi Arabia
[d] Toxicology and Biomedicine Research Group, Faculty of Applied Sciences, Ton Duc Thang University, Ho Chi Minh City, Vietnam

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ABSTRACT

Antrodia camphorata is an expensive mushroom that grows on the inner cavity of an endangered native tree of Taiwan namely Cinnamomum kanehirai Hayata. It is used as a traditional medicine in Taiwan and has several health benefits including free radical scavenging, anti-inflammatory, antimicrobial, hepatoprotective, neuroprotective, antidiabetic, and free radical-induced DNA damage protecting activities. Antroquinonol is a tetrahydro ubiquinone derivative found predominantly in the mycelium of Antrodia camphorata, and is characterized by numerous biological and pharmacological activities. Several studies have revealed potential anticancer effects of antroquinonol in various carcinogenic models. Moreover, a phase II clinical trial is ongoing in the US and Taiwan to treat the lung cancer patients with this active compound. The present review aims at depicting a detailed view of the synthetic procedures of antroquinonol as well as deciphering its potential health benefits with a special emphasis on anticancer properties.

I. Introduction

Phytotherapy or use of traditional plant medicines in treating various detrimental diseases including cancer is gaining importance as a science-based alternative to the conventional pharmaceuticals [1]. Considering much less side-effects of plant extracts, many studies have been done, and are actively continuing, to identify, isolate, and analyze the potential health benefits of active plant compounds in the context of their implementation in healthcare settings [2].

Antrodia camphorata is an expensive mushroom that grows on the inner cavity of an endangered native tree of Taiwan namely Cinnamomum kanehirai Hayata (Lauraceae) [3]. Over many decades,

compounds that include terpenoids, benzenoids, lignans, benzoquinone derivatives, succinic and maleic derivatives, polysaccharides, sterols, nucleotides, fatty acids, and so on (Table 1) [3]. The majority of active compounds found primarily in the fruiting bodies of Antrodia camphorata are terpenoids, and many studies have been done to evaluate the biological and pharmacological properties of this particular group of compounds [9,10]. Of these properties, anti-cancer and anti-inflammatory effects of terpenoids are well-characterized in the literature [9,11–13]. However, despite many health benefits, large-scale production of these compounds as natural medicines is difficult due to very slow natural growth rate and host specificity of fruiting bodies. These peculiar characteristics of fruiting bodies demand for identifying other
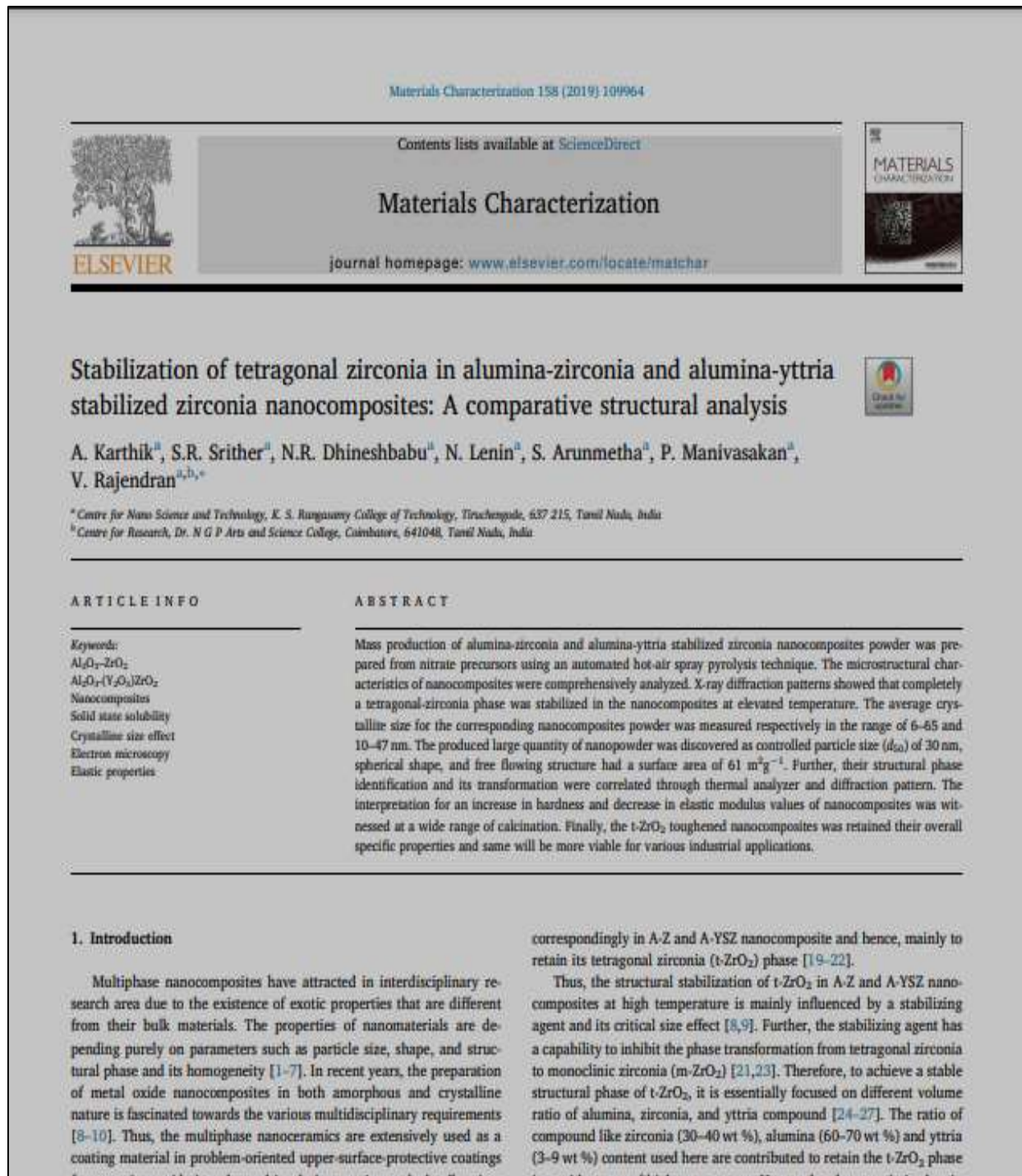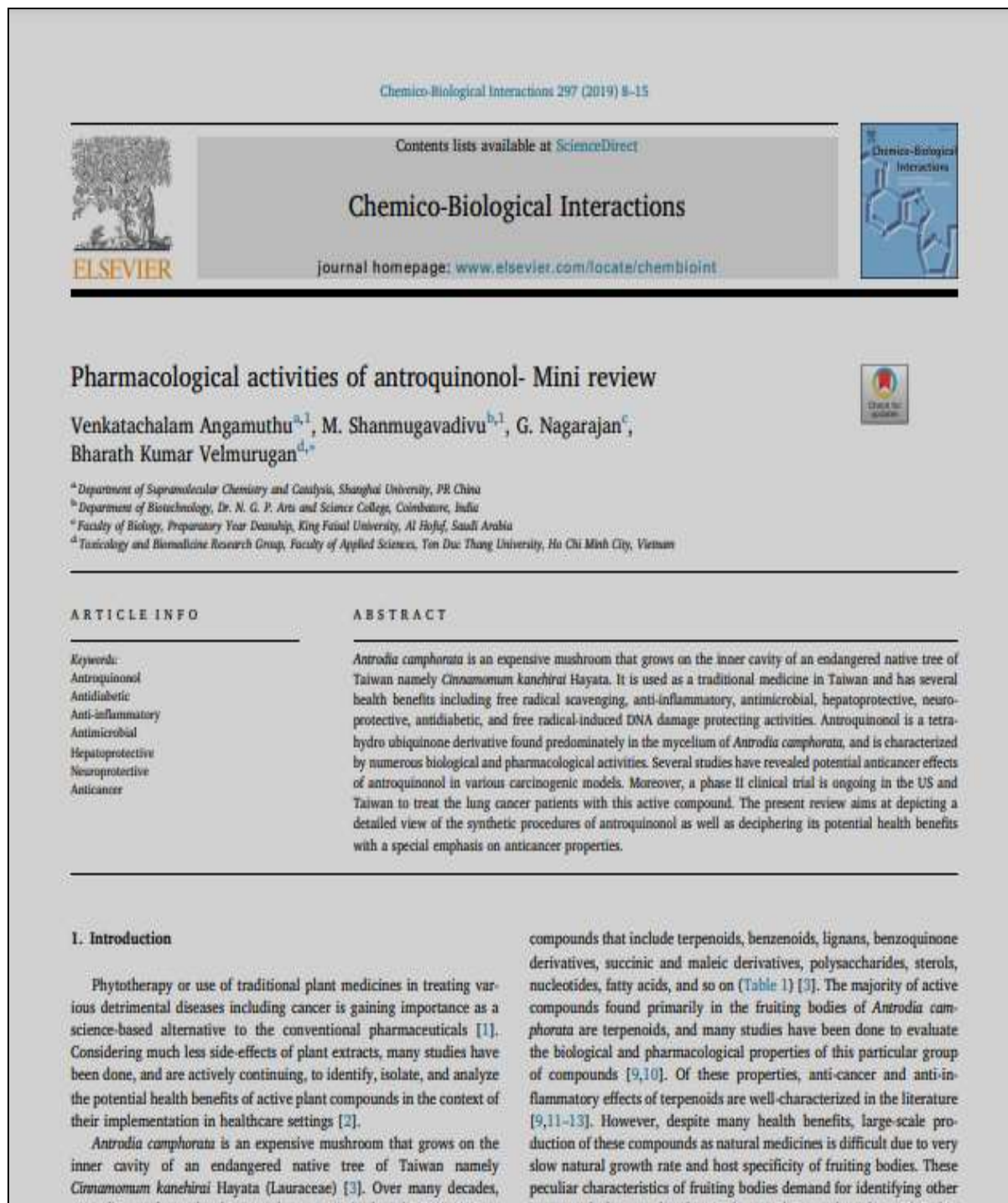
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OPEN

Silicon confers protective effect against ginseng root rot by regulating sugar efflux into apoplast

Ragavendran Abbai[1], Yu-Jin Kim[2], Padmanaban Mohanan[1], Mohamed El-Agamy Farh[1], Ramya Mathiyalagan[1], Dong-Uk Yang[2], Suriyaprabha Rangaraj[3], Rajendran Venkatachalam[3,4], Yeon-Ju Kim[2*] & Deok-Chun Yang[1,2*]

Root rot caused by *Ilyonectria mors-panacis* is a devastating fungal disease leading to defect in root quality and causes reduced yield during the perennial life cycle of *Panax ginseng* Meyer. This indicates the imperative need to understand the molecular basis of disease development and also to enhance tolerance against the fungus. With this idea, the protective effect of silicon (supplied as silica nanoparticles) in *P. ginseng* root rot pathosystem and its molecular mechanism was investigated in the current study. We have tested different concentrations of silicon (Si) to disease-infected ginseng and found that long term analysis (30 dpi) displayed a striking 50% reduction in disease severity index upon the treatment of Si. Expectedly, Si had no direct degradative effect against the pathogen. Instead, in infected roots it resulted in reduced expression of *PgSWEET* leading to regulated sugar efflux into apoplast and enhanced tolerance against *I. mors-panacis*. In addition, under diseased condition, both protopanaxadiol (PPD) and protopanaxatriol (PPT) type ginsenoside profile in roots were higher in Si treated plants. This is the first report indicating the protective role of Si in ginseng-root rot pathosystem, thereby uncovering novel features of ginseng mineral physiology and at the same time, enabling its usage to overcome root rot.

Panax ginseng Meyer is an Oriental medicinal adaptogen and ginsenosides are the major pharmacologically active components of ginseng, which is proved to be effective against various diseases[1]. It is perennial in nature and the transition from vegetative to reproductive phase occurs at the third year and the accumulation of ginsenosides in roots increases with age[2]. Ginseng root rot caused by the fungus, *Ilyonectria mors-panacis* is one of the devastating diseases which initially infects the root tip and then proceeds until the crown. In addition, replanting results in infection of new plants. Hence, there is an imperative need to design strategies to overcome ginseng root rot. Younger age (~2 years) of the plant, acidic soil (pH 5.5–6.0), soil temperature (18–20 °C), high iron content are the major factors that promote the occurrence of root rot[3,4].

Pathogen invades a plant to acquire nutrients which are majorly sugars, to support their growth and replication[5]. Understanding the molecular signaling events during plant-pathogen interaction is of great importance to establish strategies to overcome the pathogen. The plant defense system initially detects the pathogen, followed by the activation of the appropriate signal cascades. The downstream defense responses especially the crucial role of hormonal pathways such as SA (Salicylic acid), JA (Jasmonic acid) and Ethylene (ET) mediated pathways are well established. Periodic global transcriptome analyses by RNAseq revealed that JA and ET are majorly activated in ginseng-root rot pathosystem[6]. Previously, JA had been demonstrated to influence the triterpenoid pathway in ginseng and *PgSE2* was found to influence phytosterol biosynthesis[7,8]. Phytosterols are essential component of the plasma membrane that determines its rigidity/fluidity. Certain pathogens have the ability to modify the composition of the phytosterols in the plasma membrane to alter nutrient efflux[9,10].

[1]Graduate School of Biotechnology, College of Life Science, Kyung Hee University, Yongin, 446-701, South Korea. [2]Department of Oriental Medicinal Biotechnology, College of Life Science, Kyung Hee University, Yongin, 446-701, South Korea. [3]Centre for Nanoscience and Technology, K. S. Rangasamy College of Technology, Tiruchengode, 637215, Tamil Nadu, India. [4]Dr. N.G.P Arts and Science College, Kalapatti road, Coimbatore, 641048, Tamil Nadu, India. *email: yeonjukim@khu.ac.kr; dcyang@khu.ac.kr

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Criterion III Metric 3.4.5

mACPpred: A Support Vector Machine-Based Meta-Predictor for Identification of Anticancer Peptides

Vinothini Boopathi [1], Sathiyamoorthy Subramaniyam [2,3], Adeel Malik [4], Gwang Lee [5,*],
Balachandran Manavalan [5,*] and Deok-Chun Yang [1,*]

1. Graduate School of Biotechnology, College of Life Science, Kyung Hee University, Yongin-si 17104, Gyeonggi-do, Korea; vinothini9327@gmail.com
2. Research and Development Center, Insilicogen Inc., Yongin-si 16954, Gyeonggi-do, Korea; moorthy@insilicogen.com
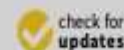3. Department of Biotechnology, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu 641048, India
4. Department of Microbiology and Molecular Biology, College of Bioscience and Biotechnology, Chungnam National University, Daejeon 34134, Korea; adeel@procarb.org
5. Department of Physiology, Ajou University School of Medicine, Suwon 443380, Korea
* Correspondence: glee@ajou.ac.kr (G.L.); bala@ajou.ac.kr (B.M.); dcyang@khu.ac.kr (D.-C.Y.)

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Abstract: Anticancer peptides (ACPs) are promising therapeutic agents for targeting and killing cancer cells. The accurate prediction of ACPs from given peptide sequences remains as an open problem in the field of immunoinformatics. Recently, machine learning algorithms have emerged as a promising tool for helping experimental scientists predict ACPs. However, the performance of existing methods still needs to be improved. In this study, we present a novel approach for the accurate prediction of ACPs, which involves the following two steps: (i) We applied a two-step feature selection protocol on seven feature encodings that cover various aspects of sequence information (composition-based, physicochemical properties and profiles) and obtained their corresponding optimal feature-based models. The resultant predicted probabilities of ACPs were further utilized as feature vectors. (ii) The predicted probability feature vectors were in turn used as an input to support vector machine to develop the final prediction model called mACPpred. Cross-validation analysis showed that the proposed predictor performs significantly better than individual feature encodings. Furthermore, mACPpred significantly outperformed the existing methods compared in this study when objectively evaluated on an independent dataset.

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Article

Preparation of Polyethylene Glycol-Ginsenoside Rh1 and Rh2 Conjugates and Their Efficacy against Lung Cancer and Inflammation

Ramya Mathiyalagan [1,†], Chao Wang [2,3,†], Yeon Ju Kim [2], Verónica Castro-Aceituno [2], Sungeun Ahn [2], Sathiyamoorthy Subramaniyam [2,4], Shakina Yesmin Simu [1], Zuly Elizabeth Jiménez-Pérez [1], Deok Chun Yang [1,2,*] and Seok-Kyu Jung [2,*]

[1] Graduate School of Biotechnology, College of Life Science, Kyung Hee University, Yongin-si, Gyeonggi-do 17104, Korea; ramyabinfo@gmail.com (R.M.); simu.sha2@gmail.com (S.Y.S.); zejp78@gmail.com (Z.E.J.-P.)

[2] Department of Oriental Medicinal Biotechnology, College of Life Science, Kyung Hee University, Yongin-si, Gyeonggi-do 17104, Korea; chaow@sdut.edu.cn (C.W.); yeonjukim@khu.ac.kr (Y.J.K.); ca.veronica@khu.ac.kr (V.C.-A.); se8688@gmail.com (S.A.); s.sathiyamurthi@gmail.com (S.S.)

[3] Institute of Biomedical Research, School of Life Sciences, Shandong University of Technology, Zibo 255000, Shandong, China

[4] Department of Biotechnology, Dr.N.G.P., Arts and Science College, Coimbatore 641048, Tamil Nadu, India

[*] Correspondence: dcyang@khu.ac.kr (D.C.Y.); seokkyujung@gmail.com (S.-K.J.)

[†] These authors contributed equally to this work.

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Abstract: Low solubility and tumor-targeted delivery of ginsenosides to avoid off-target cytotoxicity are challenges for clinical trials. In the present study, we report on a methodology for the synthesis of polyethylene glycol (PEG)-ginsenoside conjugates through a hydrolysable ester bond using the hydrophilic polymer polyethylene glycol with the hydrophobic ginsenosides Rh1 and Rh2 to enhance water solubility and passive targeted delivery. The resulting conjugates were characterized by ^1H nuclear magnetic resonance (^1H NMR) and Fourier-transform infrared spectroscopy (FT-IR). ^1H NMR revealed that the C-6 and C-3 sugar hydroxyl groups of Rh1 and Rh2 were esterified. The conjugates showed spherical shapes that were monitored by field-emission transmission electron microscopy (FE-TEM), and the average sizes of the particles were 62 ± 5.72 nm and 134 ± 8.75 nm for PEG-Rh1and PEG-Rh2, respectively (measured using a particle size analyzer). Owing to the hydrophilic enhancing properties of PEG, PEG-Rh1 and PEG-Rh2 solubility was greatly enhanced compared to Rh1 and Rh2 alone. The release rates of Rh1 and Rh2 were increased in lower pH conditions (pH 5.0), that for pathophysiological sites as well as for intracellular endosomes and lysosomes, compared to normal-cell pH conditions (pH 7.4). In vitro cytotoxicity assays showed that the PEG-Rh1conjugates had greater anticancer activity in a human non-small cell lung cancer cell line (A549) compared to Rh1 alone, whereas PEG-Rh2 showed lower cytotoxicity in lung cancer cells. On the other hand, both PEG-Rh1 and PEG-Rh2 showed non-cytotoxicity in a nondiseased murine macrophage cell line (RAW 264.7) compared to free Rh1 and Rh2, but PEG-Rh2 exhibited