NATIONAL CONFERENCE ON

MATERIALS AND MATHEMATICAL SCIENCES

(NCMMS-2023)

March 30&31, 2023

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DR. C. RAMALINGAN

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Dr. K. Sridharan
Chancellor

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Vice-Chancellor

MESSAGE

I am pleased to message that the School of Advanced Sciences, an energetic school of our Institution with diversified expertise organizes National Conference on Materials and Mathematical Sciences (NCMMS-2023) on March, the 30th & 31st 2023. Material Science plays an ever increasing role in our modern society and they form the basis for a wide range of technologists across the world. This conference would provide an attractive platform for interaction among the eminent professionals, researchers and scholars of different fields from both academic and industry under one roof to discuss and share the state of the art development in Material and related Sciences.

I congratulate and wish the faculty members of the School of Advanced Sciences on the endeavour and bless them all with divine grace.

K. Sridharan
CHANCELLOR

Trust Office : No. 52 (Old NO. 14), Sriman Srinivasan Road, Alwarpet, Chennai - 600 018, India
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Dr. S. Narayanan
Vice-Chancellor

MESSAGE

I am pleased to message that the School of Advanced Sciences, a vibrant school of our Institution with diversified expertise organizes National Conference on Materials and Mathematical Sciences (NCMMS-2023) on March, the 30th & 31st, 2023. Material Science plays an ever increasing role in our modern society and they form the basis for a wide range of technologies. The term material science covers diverse material classes ranging from semiconductors over polymers and their molecular crystals to nanoparticles. In the present century, there is a tremendous growth of each and every field of Material Science. I believe that the conference will bring together foremost academic and industrial scientist, research scholars and research students to exchange and share their expertise and research results on almost all areas of Material and Mathematical Sciences.

I applaud and wish the School of Advanced Sciences community of our Institution on their venture and I'm indeed happy to support in all plausible ways for the successful completion of the same.

(Dr. S. SHASI ANAND)
VICE-PRESIDENT

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Dr. S. Narayanan
Vice-Chancellor

MESSAGE

It is heartening to note that the School of Advanced Sciences of our University is organizing National Conference on Materials and Mathematical Sciences (NCMMS-2023) on March, the 30th & 31st, 2023. A wide range of interests in diverse fields of Science and Technology including Chemistry, Physics, Biotechnology, Applied Mathematics, and Engineering would be covered here to contribute significantly to the community of Advanced Materials. Since researchers from Science family being one of the key contributors of Material Science, it is appropriate that the School of Advanced Sciences of our University has taken a lead in organizing this conference.

This conference will, no doubt, give a chance to the faculty members, researchers, scientists, and students from various organizations to interact with the renowned Experts and exchange ideas and forge collaborative programs for mutual benefits. I wish the conference a grand success and my greetings to all the delegates, guests, and the organizers of the conference.

(Dr. S. NARAYANAN)
VICE-CHANCELLOR

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MESSAGE

I am delighted to note the School of Advanced Sciences of our University is organizing National Conference on Materials and Mathematical Sciences (NCMMS-2023) on March, the 30th & 31st, 2023. There has been substantial advancement in research and development of polymers, ceramics, semiconducting materials and composites as functional materials in the field of structural, membrane, biomedical, sensor and energy applications. The focus of this conference is to share knowledge among researchers, practicing engineers and technologists about the state of the art in material science and their applications.

I am sure that the conference affords an excellent opportunity to research scholars, students delegates from various institutions to come together to exchange their innovative ideas, current trend in material science and gain experiences through fruitful interactions with eminent scientists. I wish the conference a grand success.

(Dr. V. VASUDEVAN)
REGISTRAR

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(NCMMS-2023)

March 30&31, 2023

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PREFACE

It gives us immense pleasure to present the souvenir of the National Conference on Materials and Mathematical Sciences (NCMMS-2023) on March, the 30th & 31st, 2023 organized by the School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil. This conference aims to bring together foremost academic scientists, researchers, industrialists and post-graduate students to share their experiences and research results on all aspects of materials and mathematical sciences. It also provides a leading interdisciplinary platform for researchers and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Materials and Mathematical Sciences.

The abstract book covers the topics given under

- ♥ *Energy materials*
- ♥ *Nano and biomaterials*
- ♥ *Chemo- and biosensors*
- ♥ *Semiconducting materials*
- ♥ *Catalytic materials*
- ♥ *Electro materials*
- ♥ *Smart materials*
- ♥ *Mathematics for materialists*
- ♥ *Applied & pure mathematics*
- ♥ *Optical materials*
- ♥ *Crystal growth of advanced materials*
- ♥ *Materials for environmental applications*
- ♥ *Polymer and composite materials*
- ♥ *Organic & inorganic materials*

Researchers pursuing cutting-edge research in the aforementioned areas are invited to participate and deliver lectures highlighting recent advances in their field of research.

No words are adequate to express our sincere thanks to our Chancellor, Pro-Chancellor, Vice-President(s), Vice-Chancellor, Registrar and National Advisory Committee Members for their constant encouragement and support to organize this conference. We are grateful to the Chief-guest, all the invited

speakers and also authors of contributed papers for their participation in the conference and cooperation to bring out this book on time. We very much appreciate and thank the Science and Engineering Research Board of the Department of Science & Technology (DST-SERB), Defence Research Development Organization (DRDO), Council of Scientific and Industrial Research (CSIR), Association of Chemistry Teachers (ACT), Royal Society of Chemistry (RSC) and Kalasalingam Academy of Research and Education (KARE) for their financial assistance. We thank all the members of the local advisory committee, all colleagues of the School of Advanced Sciences and fellow colleagues of other departments for their support and efforts in making the event successful.

Dr. C. Ramalingan, Dean – School of Advanced Sciences

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ORAL PRESENTATIONS

POSTER PRESENTATIONS

OP-01

Detection of mercury and cyanide using quinoline – thiourea conjugate as a fluorescent probe

G. Narmatha, A. Elizabeth and R. Nandhakumar*

Fluorensic Materials Laboratory, Department of Applied Chemistry,
Karunya Institute of Technology and Sciences (Deemed-to-be University),
Karunya Nagar, Coimbatore - 641 114, INDIA.
E-mail: nandhakumar@karunya.edu

Fluorescent chemosensors has been the recent field of research area for the detection of biologically and environmentally important analytes. Over the years, the detection and sensing of metal ions has emerged as an important role in the field of chemical sensors. Besides the various analytical methods, the fluorescence spectroscopy based chemosensors has a substantial play due to its simplicity and high detection limit. Among the various cations, Mercury shows high toxicity that affect environment and human health deeply. And a variety of diseases are closely associated with the adverse effects of Hg^{2+} ions. In addition, Cyanide is well-known hazardous chemical and widely used in many chemical industries, such as electroplating, leather and metallurgy. Utilization of CN^- can cause many adverse effects on human body such as vision, endocrine, heart and central nervous system and even threaten life. Out of various methods available for the detection of Hg^{2+} and CN^- ions the spectrofluorometry is extensively used due to its high sensitivity. Due to this, detection of Hg^{2+} and CN^- metal ions has attained a high significance in fluorescence chemosensing. Thiourea based ligands are organosulfur compounds having excellent biological and non-biological applications. These compounds contain S- and N-, which are nucleophilic and allow for establishing inter and intra-molecular hydrogen bonding. These characteristics make thiourea moiety a very important chemosensor to detect various environmental pollutants. In this work, a simple fluorescence sensor based on 8-Aminoquinoline and Phenyl isothiocyanate (AQS) was designed and characterized by ^1H NMR and ^{13}C NMR and Mass spectrum.

It was investigated by UV-Vis and fluorescence spectroscopy (DMSO-H_20, 1:1v/v, pH=7.4) buffer solution. The result of the Job's plot indicating that the binding stoichiometric ratio are 1:1 for Hg^{2+} and CN^-. The limit of detection (LOD) value is found to be 0.024×10^{-2}M. The application studies are underway in our laboratory.

OP-02

Searching of new orthogonal polynomials and its applications in quantum theory

Rajesh Kumar Yadav*

Department of Physics,

S. K. M. University, Dumka-Jharkhand (India)-814110

Email: rajeshastrophysics@gmail.com

In quantum theory, the solutions of most of the solvable potentials are in the form of known orthogonal polynomials or special mathematical functions. Some of these well known potentials are harmonic oscillator potential, the Coulomb potential and the Scarf potential etc., whose solutions are related to Hermite polynomials, Laguerre polynomials and the Jacobi Polynomials etc., respectively. Recently, after searching of new special functions (also known as the exceptional orthogonal polynomials), a family of new solvable potentials are constructed. The solutions of these new potentials are also obtained exactly and written in terms of exceptional orthogonal polynomials.

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3. Levai, G. J. *Phys. A: Math. Gen,* 22, **1989**, 689.
4. Yadav, R. K.; Banerjee, S.; Khare, A.; Kumari N.; Mandal, B. P. *Ann. Phys. (N. Y.),* 436, **2022**, 168679.

OP-03

Trend analysis of temperature and precipitation: a case study of selected districts in kerala

M. Devika, K. Aadithya Dev, Sunil and R. Parameswaran

Department of Mathematics

Amrita School of Physical Sciences

Amrita Vishwa Vidyapeetham, Kochi, India.

In this paper, we focus on conducting three correlation tests, Spearman, Pearson, and Mann-Kendall correlation tests, and another test to measure the magnitude of the Mann-Kendall test, Sen's slope. The correlation is used on two different variables to identify their degree of dependency on each other. Here, this paper focuses on the variable's precipitation and temperature. The study was conducted in Kerala, a southern state of India. Our aim with the study is to analyze the trend of the variables and thereby help the state's agricultural sector.

OP-04

Ultrasensitive optical biosensing of vit B1 using red emitting N-doped carbon dots

K. Nandhini and Malaichamy Ilanchelian*

Department of Chemistry, Bharathiar University, Coimbatore, Tamil Nadu.

Email: chelian73@yahoo.com

Herein, a simple approach for the synthesis of red emitting N - doped carbon dots (N - CDs) has been developed by hydrothermal method using *p*-phenylenediamine and ethylenediamine as a precursor. The obtained N - CDs showed excellent in photophysical property under different physiological conditions. High resolution transmission electron microscopy (HR-TEM) analysis shows that the prepared N - CDs are spherical morphology with an average

particle size is ~ 4.5 nm. The N - CDs exhibited bright red fluorescent with optimum emission wavelength at 620 nm upon its excitation wavelength at 480 nm. The fluorescence N - CDs was selectively quenched by thiamine (Vit B1) through a fluorescent turn - off mechanism (scheme 1). The N - CDs probe showed highly specific and selective detection of Vit B1 over other common interfering biomolecules. The N - CDs probe could selectively detect Vit B1 as low as 2.8 nM. The static quenching mechanism occurred between N - CDs and Vit B1 which was further confirmed using Stern - Volmer plot and fluorescence life time analysis. The cytotoxicity of the N-CDs toward MDA-MB-231 cells revealed that the N - CDs did not possess any significant cytotoxicity. The application of N -CDs in bioimaging of cells is ascertained by fluorescence microscopic analysis.

OP-05

Preparation and characterization of zinc doped cerium oxide nanoparticles for photocatalytic applications

C. Swathi[1,3], A. Samson Nesaraj[1,2*]

[1]Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Karunya Nagar, Coimbatore – 641 114

[2]Department of Chemistry, Kalasalingam Academy of Research Education (Deemed to be University), Krishnankoil, Srivilliputhur – 626 128

[3]Department of Chemistry, Keshav Memorial Institute of Technology, 3-5-1026, Narayanaguda, Hyderabad – 500 029, Telengana, India.

Email address: samson@klu.ac.in

The removal of effluents released from textile industries is expensive. The chemical treatment like photocatalysis is of low-cost and highly effective for the removal of organic effluents compared to other purification techniques. Recent studies revealed ceria-based nanoparticles gained immense application in

industrial and medical fields. In this study, pure CeO_2 and Zn doped CeO_2 ($Ce_{1-x}Zn_xO_{2-\delta}$; x = 0.1, 0.2, 0.3, 0.4, 0.5) nanoparticles were synthesized through the chemical precipitation method. These particles were characterized by different techniques like X-ray diffraction (XRD), Fourier-Transform infrared (FT-IR), Scanning electron microscopy (SEM) and Energy dispersive X-ray (EDAX), UV and PL to study their structural, physico-chemical and catalytic properties. The crystallite size is calculated from XRD data using Debye – Scherrer's formula. SEM analysis confirms that the synthesized particles are in the nano range. The presence of dopants with varying composition was further confirmed from EDAX analysis. Promising results have been reported using zinc doped cerium oxide nanoparticles with significant properties for the dye degradation under UV light irradiation.

OP-06

Selective detection and determination of copper metal ion using naphthalene – dithiourea conjugate as fluorescent chemosensor

A. Elizabeth, G. Narmatha and R. Nandhakumar*

Fluorensic Materials Laboratory, Department of Applied Chemistry,
Karunya Institute of Technology and Sciences (Deemed-to-be University),
Karunya Nagar, Coimbatore - 641 114, India.
E-mail: nandhakumar@karunya.edu

Over the years, the detection and sensing of metal ions has emerged as an important role in the field of chemical sensors. Besides the various analytical methods, the fluorescence spectroscopy based chemosensors has a substantial play due to its simplicity and high detection limit. Among all the analytes, specifically cations, the element copper has significant attention because of its paramagnetic nature. The presence of copper for the development of human

growth is in the order of 0.1mg/L respectively. Copper has more connectivity to human in daily life, which makes it more dangerous for environment bodies. The deviation from the optimal concentration of Cu (II) ion in the human body leads to several health issues. In this work a simple Thiourea based simple S-S Disulphide bridged dimeric chemosensor probe (CNS) has been designed, synthesized, and successfully characterized for the specific recognition of Cu^{2+} ions. The CNS was synthesized in one step reaction between Cystamine dihydrochloride and 1-Naphtylisothiocyanate.The sensor was isolated purely and it is completely soluble in DMF solvent and hence all fluorescence studies was carried out using DMF. Sensing behavior toward various metal ions was investigated by UV-Vis and fluorescence spectroscopy in DMF : H2O (v/v, 1:1) solution. The Job's plot based on fluorescence data showed 1:1 complex formation between CNS and Cu^{2+} ion. Besides binding constant between CNS and Cu2+ is found to be 8.06 x 10^{-2} M using Stern-Volmer equation. The effect of pH, time and reversibility of the sensor are studied. In summary we have developed and fluorescent sensor for the selective sensitive and reversible for Cu^{2+} ion in DMF. The limit of detection is proved 0.6811x10^{-2} from titration and 1:1 binding ratio is proved from jobs plot method. The application studies are underway in our laboratory.

OP-07

DFT, spectroscopic, molecular docking, antimicrobial and ADMET studies on Umbeliferone: a breast cancer drug

A. Shiney[a], S. Jeyavijayan[b*] M. Ramuthai[c]

[a]*Department of Physics, Pocker Sahib Memorial Orphanage College, Tirurangadi, Malappuram, Kerala-676306, India*

[b]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, India*

[c]*Department of Physics, Arumugham Palaniguru Arts and Science College for Women, Chatrapatti-626102, Tamil Nadu, India*

EMAIL: s.jeyavijayan@klu.ac.in

In this study the FTIR and FT-Raman spectra of Umbeliferone have been recorded. Utilizing the observed FT-Raman and FTIR data, a complete vibrational assignment and analysis of the fundamental modes of the compound have been carried out. In the calculations performed to determine the optimum molecular geometry, harmonic vibrational frequencies, IR intensities and Raman scattering activities, the density functional theory (DFT/B3LYP) method with 6-311++G(d,p) basis set has been used. The effects of Frontier orbitals, UV absorption, natural bond orbital (NBO) and molecular electrostatic potential (MEP) have been discussed. The antimicrobial activity of the molecule suggests its most powerful efficacy against E.coli in terms of zone of inhibition. The docking study approves that the Umbeliferone works as a new inhibitor of breast cancer targeted progesterone receptor (PR) protein with highest binding energy (-6.6 kcal/mol). ADMET results showed a good human intestinal absorption probability, a favorable blood brain barrier crossing and a high plasma protein binding percentage. Therefore, the Umbelliferon might have potent therapeutic action against breast cancer.

OP-08

Amine and imine-functionalized Mn-based MOF as unusual turn-on and turn-off sensor for d^{10} heavy metal ions and efficient adsorbent to capture iodine

S. Kamal and M. Khalid*

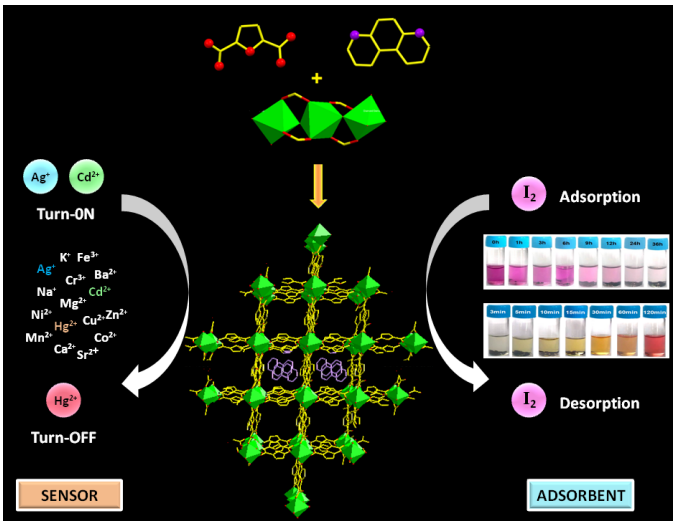
Functional Inorganic Materials Lab (Fiml), Department of Chemistry, Aligarh Muslim University, Aligarh, 202002

Email: khalid215@gmail.com

In this work an Mn-based metal-organic framework (MOF), $\{[H\text{-}Phen]_2[Mn_3(FDA)_4(H_2O)_2]\cdot 2H_2O\}_n$ (SM-1) has been synthesized solvothermaly using 2,5-Furandicarboxylic acid (2,5-FDA) as linker and 4,7-Phenanthroline (4,7-Phen) as coligand. The SM-1 was characterized by elemental analysis, FTIR, PXRD and crystallographic studies. Single crystal X-ray data reveal that SM-1 framework is constituted by trinuclear Mn-SBUs as dianion **(**$[Mn_3(COO)_6]^{2-}$), 2,5-FDA and free 4,7-Phenanthrolinium cation $[H\text{-}Phen]^+$ rings containing uncoordinated amino and imino moieties which provides extra stability to the framework as well as feasible recognition sites to interact with analytes. Overall, the MOF is anionic in nature which is counter balanced by two protonated phenanthrolinium cations thus giving rise to +2 oxidation states to all three Mn ions**.** Topological analysis discloses that SM-1 has a $\{4^4.6^2\}$ point symbol having 4-c uninodal net with sql topology. SM-1 is an excellent fluorescent sensor for d^{10} heavy metal ions in an aqueous environment. SM-1 developed as a highly sensitive sensor, exhibits fluorescence "turn-on" response for Ag^+ and Cd^{2+} ions while fluorescence "turn-off" response in case of Hg^{2+} ion with much lower LOD values. Moreover, SM-1 application is not limited to only sensing but it can also serve as an adsorbent to capture hazardous substances. Owing to the presence of π-electron-rich moieties and uncoordinated nitrogen atoms in the SM-1 framework, it is also explored for efficient iodine uptake. The SM-1 captures

iodine reversibly in cyclohexane solution with high adsorption capacity within 36 h. Further, a plausible mechanism of sensing and iodine adsorption was also discussed briefly. So far as we know, it is the first example of Mn-based anionic MOF functioning as fluorescent sensor to simultaneously detect d^{10} heavy metal ions in water and as an adsorbent to trap iodine. Thus, metal-organic chemistry has been employed to develop multifunctional MOF material for the sensing of hazardous metal ion and as an adsorbent for the removal of toxic iodine.

GRAPHICAL ABSTRACT



OP-09

$CeNiO_3$ perovskite based nano-structured material for supercapacitor application

J. Vinaya[1], J. Vismaya[1] and A. Samson Nesaraj[1,2*]

[1]*Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Karunya Nagar, Coimbatore – 641 114, Tamil Nadu, India.*

[2]*Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Anand Nagar, Krishnankoil – 626 126, Tamil Nadu, India.*

**E-mail: samson@klu.ac.in*

Energy and environment problems head the top list of worldwide issues in front of society for nowadays. Perovskite based nanostructures are widely investigated in supercapacitor field owing to their unique morphological features and outstanding electrochemical properties such as electronic conductivity, ionic conductivity, supermagnetic, thermoelectric, photocatalytic, dielectric properties, *etc.* Herein, $CeNiO_3$ perovskite based nanostructured material was successfully synthesised by chemical precipitation method. The resultant perovskite material was characterized X-ray diffraction (XRD), Scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), and Energy dispersive X-ray spectroscopy (EDAX). The electrochemical performance of synthesised material was studied by Cyclic voltammetry (CV), Galvano-static charge/ discharge (GCD), and Electrochemical impedance spectroscopy.

OP-10

Quantum chemical, molecular docking and in vitro antimicrobial studies of 2-(2-chlorophenyl)benzimidazole: as vascular endothelial growth factor receptor

V.S. Kunjumol [a], S. Jeyavijayan[b*], M. Ramuthai[c]

[a]*Department of Engineering, University of Technology and Applied Science, Shinas, Oman*

[b]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, India*

[c]*Department of Physics, Arumugham Palaniguru Arts & Science College for Women, Rajapalayam-626 102, Tamil Nadu, India*

[*]*Email: s.jeyavijayan@klu.ac.in*

Benzimidazole derivatives show a wide variety of biological and pharmacological actions. In this work, 2-(2-Chlorophenyl)benzimidazole (CPBZ) molecule is proposed, and its pharmacological properties are studied. The density functional theory (DFT) studies, Spectroscopic characterization, ADMET prediction, and molecular docking have been used to explain the chemical nature, drug likeness and binding properties of the molecule. The orbital energy gap and molecular electrostatic potential have been evaluated to show the charge distributions that could be related with the biological action. Natural bond orbital (NBO) study exposed about the interaction between donor and acceptor regions of the molecule. The antimicrobial properties of the molecule have been tested against various gram-positive and gram-negative bacteria and shown a notable antimalarial activity. The molecule CPBZ explored a high binding energy (-6.10 kcal/mol) within the active responses of vascular endothelial growth factor (VEGF) protein. The formation of hydrogen bonds in protein-ligand relations reveals that CPBZ could be accessible as a capable drug candidate as VEGF receptor. ADMET results exhibited that the CPBZ has the good pharmacokinetic processes.

OP-11

On global functions in topological spaces

U. Muthumari[1*], M. Kameswari[2]

1 Assistant Professor, The Standard Fireworks Rajaratnam College for Women, Sivakasi-626123.

2 Associate Professor, Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil -626126.

Email: muthumari-mat@sfrcollege.edu.in

A filter F on a set X is a non-empty family of subsets of X such that (i) $\varphi \notin$ F (ii) F is closed under finite intersections (iii)if B $\in$ F and B $\subset$ A then A $\in$ F, for all A,B $\subseteq$ X. In this paper, we introduced global function via filters. Also we discussed some of its properties and exhibit a relation between local function and global function in topological spaces.

OP-12

$CuCo_2O_4$ spinel based nano-structured material for supercapacitor application

J. Vismaya[1], J. Vinaya[1], A. Samson Nesaraj[1,2*]

[1]*Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Karunya Nagar, Coimbatore – 641 114, Tamil Nadu, India.*

[2]*Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), AnandNagar, Krishnankoil – 626 126, Tamil Nadu, India.*

**E-mail address: samson@klu.ac.in*

Over the past few decades, owing to their unique functional properties such as physical, chemical, electrical conductivity, thermal stability, ionic conductivity, specific capacitance, and thermoelectric, spinel materials have attracted significant scientific attention in supercapacitor field. In this work, we demonstrate the spinel structure $CuCo_2O_4$ spinel based nanostructured material, synthesized by a chemical precipitation method. The fabricated $CuCo_2O_4$ sample was characterized by X-ray diffraction (XRD), Scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), and Energy dispersive X-ray spectroscopy (EDAX). The electrochemical performance of prepared electrode material was examined by Cyclic voltammetry (CV), Galvano-static charge/discharge (GCD), and Electrochemical impedance spectroscopy.

OP-13

Molecular docking, admet and quantum chemical studies of trans-4-(trifluoromethyl)cinnamic acid

M. Ramuthai[a], S. Jeyavijayan[b*], K. Siva[b] and A. Shiney[c]

[a]*Department of Physics, Arumugham Palaniguru Arts and Science College for Women, Chatrapatti-626102, Tamil Nadu, India*

[b]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, India*

[c]*Department of Physics, Pocker Sahib Memorial Orphanage College, Tirurangadi, Malappuram, Kerala-676306, India*

[*]*Email: s.jeyavijayan@klu.ac.in*

Trans-4-(trifluoromethyl) cinnamic acid has a double bond -C=C- among the aromatic system and the carboxyl ring which disturbed the π-electrons of the molecule. The absorption spectra of trans-4-(trifluoromethyl) cinnamic acid (4TFCA) have been calculated by using the Time dependent/Density Functional Theory approach. The geometrical parameters of the ground state of 4TFCA is computed using the DFT/B3LYP by higher basis set (6-311++G(d,p)) and the frontier molecular orbital analysis is achieved. FTIR and FT-Raman vibrational assignments of 4TFCA have been obtained in the regions 4000-400 cm^{-1} and 4000-50 cm^{-1}. The experimental vibrational frequencies are in good coordination with the calculated wavenumbers. The stability of a molecule rising from hyper-conjugative π →π* exchanges and charge delocalization has been calculated using natural bond orbital (NBO) analysis. The thermodynamic and charge responses have been studied. In addition, the results of molecular docking revealed that the molecule 4TFCA has the highest binding energy (-6.10 kcal/mol) with the histone deacetylase inhibitor (HDAC8). To understand the molecule's drug likeness, ADMET analysis has also been studied.

OP-14

Augmenting the heat transfer rate in thermal systems using CFD analysis and ferrite nanofluids

S. Umamaheswari and M. Pichumani*

Department of Nanoscience and Technology, Sri Ramakrishna Engineering College, Coimbatore-641022, INDIA.

Email: mpichumani@srec.ac.in

Nanofluids prepared by ferrite nanoparticles such as Fe_3O_4, Fe_2O_3, XFe_2O_4 (X= Mn, Zn, Ni, Cu) etc., possess reasonably higher thermophysical properties than conventional coolants due to the particle morphology and intrinsic characteristics. In the presence of external magnetic field, the rheological properties of these magnetic nanofluids increases and subsequently the heat transfer rate in the thermal systems increases. In this study, the enhancement of heat transfer rate in shell and helical coiled tube heat exchanger with $MnFe_2O_4$ and graphene oxide hybrid nanofluid is studied using CFD analysis. Comparing to water, the heat transfer rate in the heat exchanger increases up to 1.5 times while using manganese ferrite ($MnFe_2O_4$)/water nanofluid as a coolant and 2 times while using graphene oxide/ water nanofluid. It is also noticeable that the $MnFe_2O_4$ + graphene oxide hybrid nanofluid shows 2.5 times more heat transfer rate than water. For various Reynolds number and hybrid nanoparticles concentration, a linear increment in the heat transfer rate, effectiveness and overall heat transfer coefficient is observed. These ferrite nanofluids also have wide range of applications in heat sinks, heat pipes, and other fields such as biomedical, environmental, and electronical engineering.

OP-15

Modelling and simulation study of Er-TiO_2 based solid-state dye-sensitized solar cell using SCAPS-1D

J. V. Jayachithra[1], K. Elampari[2]

[1]*Research Scholar, Department 0f Physics, S. T. Hindu College, Nagercoil, Tamilnadu, 629002, Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamilnadu, 627012, India.*

[2]*Associate Professor, Department of Physics, S. T. Hindu College, Nagercoil, Tamilnadu, 629002, India.*

E-mail id: jvjayachithra@gmail.com, elampari@rediffmail.com

In this study, we employed the SCAPS-1D software to analyze the performance of a new solid-state dye-sensitized solar cell (ssDSSC) featuring dual photoanode layers comprised of TiO_2 and 3 mol% Er-TiO_2. The proposed ssDSSC structure involved a front contact/FTO/TiO_2:3Er-TiO_2/N719/Spiro-OMeTAD/back contact configuration. Quantum efficiency response and J-V properties were examined, while ignoring recombination processes and material flaws. Results of the simulation revealed that the use of dual photoanode layers can significantly increase the efficiency of the DSSC compared to a single TiO_2 photoanode layer, with a corresponding increase in short-circuit current density and fill factor. The efficiencies of the TiO_2 and TiO_2:3Er-TiO_2 based ssDSSCs were found to be 9.81% and 10.83%, respectively. These findings suggest that the use of dual photoanode layers could improve the performance of ssDSSCs and offer potential for the development of high-efficiency solar cells.

OP-16

A best-fit probability distribution for the estimation of rainfall in india

Sidharth menon, Parthive Nandakumar and Archana Nair

Department of Mathematics, Amrita School of Physical sciences, Amrita Vishwa Vidyapeetham, Kochi, India

The recent change in the distribution and nature of precipitation extremes due to global warming has drawn a lot of attention. The present study attempts to analyze the upper 95th percentile rainfall data for the years 1901 to 2020 to look for any potential shifts in the distribution. The data is divided into three periods and variety of distributions namely Weibull, Log Normal (LN), Gamma, Generalized Extreme Value (GEV), Generalized Pareto (GP), Log Logistic, and other statistical methods are used to find the best probability distribution for extreme rainfall over Indian spatial grid points. To determine how well the distributions fit together, a variety of metrics are used, including the correlation coefficient, root mean square error, and Nash-Sutcliffe efficiency index. According to the findings, GEV is the best fit in all the three circumstances and the distribution remaining constant in 90% of the cases. In the third time period GP shows 20% efficiency in fitting the optimal distribution.

OP-17

Enhanced photocatalytic degradation of carbendazim by highly active ZnO-GCN nanocomposites

S. Ranjithkumar, V. Saravanan, K. Sachin chandrasekar and C. Ramalingan

School of Advance science, Department of Chemistry, Kalasalingam Academy of Research and Education.

Email: saravananvj11@gmail.com

A facile, green and easily scalable method has been developed to facilitate the construction of 2D-C_3N_4/3D-ZnO heterojunction materials. It uses only cheap urea and zinc oxide in a thermal spreading technique that allows the controlled growth of carbon nitride layers on zinc oxide surface. The exfoliation of bulk carbon nitride and subsequent stabilization of layers on zinc takes place during thermal spreading technique in a single step. Simple variation of carbon nitride allowed to control the morphology of carbon nitride from highly dispersed thin layer up to bulk-like structures over zinc surface. The optical absorption was enhanced with 2D-C_3N_4/3D-ZnO materials. The variation of structure and consequent differences in the solar powered decomposition of carbendazim has been analyzed. Results reveal that, the optimum loading of 7.5 wt% carbon nitride can lead to the formation of intermediate structure in between very thin layers and bulk-like structure, which achieves best contact between the two phases making effective heterojuctions. This best catalyst exhibits 98 % conversion at a timing of 80 min. The radical scavenging studies showed that O^{2-} and h^{+} performed an imperative role. In addition, a plausible mechanism of photo catalytic decomposition is also proposed for 2D-C_3N_4/3D-ZnO materials.

OP-18

Copper ions incorporated on GCN: novel and effective catalyst for the synthesis of (hetero/homoarylidene)chromenes

K. Sachin Chandrasekar. V. Saravanan, S. Ranjithkumar and C. Ramalingan.

School of Advanced Science, Kalasalingam Academy of Research and Education, Anandnagar, Krishnankoil, Tamilnadu, 626126.

Email: saravananvj11@gmail.com

Copper metal ions immobilized on graphitic carbon nitride surface, synthesized by adopting co-precipitation method and characterized by X-ray diffraction, infrared spectroscopy, scanning electron microscopy with energy dispersive X-ray, was exploited as an efficient heterogeneous catalyst for the synthesis of (hetero/homoarylidene)chromenes from heteroaromatic / homoaromatic carbaldehydes and dimedone and malononitrile through carbon-carbon double bond construction. The reaction effected well in water, a green solvent as a reaction medium at ambient temperature. The catalytic competency exposed good performance towards reusability. Added advantages include easy preparation and inexpensiveness.

OP-19

Synthesis, characterization and antibacterial activities of nano ZnO

Dr. N. Uma Sangari* and G. Revathi

PG and Research department of Chemistry, The Standard Fireworks Rajaratnam College for Women, Sivakasi.
Email:umasangariselvakumar@gmail.com

In this work, we have successfully synthesized three different ZnO nanoparticles respectively that are with morphologies of the rod, the wall and the sphere by using cost effective and chemical precipitation method. The formed ZnO samples were characterized using XRD, UV-DRS, SEM and BET techniques. XRD analysis confirmed the formation of ZnO in hexagonal wurtzite structure in the all three samples. The morphologies were confirmed by the SEM analysis. The surface area of the formed ZnO nanoparticles were estimated from the BET results. Moreover, antibacterial activity against E. coli and Bacillus. sp of the three different sample were analyzed by using disc diffusion method and received a favorable result. With all these results, we come to this conclusion that the S3 sample with nano wall shows greater antibacterial activity.

OP-20

Iron immobilized carbon nitride: a recoverable heterogeneous catalyst for the construction of bis(hetero/homoarylidene)cycloalkanones

V. Saravanan, P. Lakshmanan, C. Ramalingan*

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed To Be University), Krishnankoil, 626126, Tamil Nadu, India

Email:saravananvj11@gmail.com

Iron immobilized graphitic carbon nitride, syntheiszed by adopting co-precipitation method and characterized by X-ray diffraction, infrared spectroscopy, X-ray photoelectron spectroscopy, scanning electron microscopy with energy dispersive X-ray, and transmission electron microscopy analyses, was exploited as an efficient heterogeneous catalyst for the synthesis of bis(hetero/homoarylidene)cycloalkanones from heteroaromatic / homoaromatic carbaldehydes and cycloalkanone through carbon-carbon double bond construction. The reaction effected well in water, a green solvent as a reaction medium at ambient temperature. The catalytic competency exposed good performance towards reusability. Added advantages include easy preparation and inexpensiveness.

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OP-21

Fibrous silica oxide as an excellent partner of TiO_2 as stable and recycle photocatalyst

R. Sathishkannan, G. Nisha and B. Sundaravel

Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil 626 126, Tamilnadu, INDIA.

Email:sathishkannan@klu.ac.in

Fibrous silica oxide modified nano crystalline TiO_2 photocatalyst have been prepared by Sono chemical method. The photocatalytic activity of the KCC-1@ TiO_2 composite was prepared by different weight ratio of KCC-1 @ TiO_2 the ratio of 1:3, 1:5 and 1:7. The activity of synthesized materials was evaluated by degrading methylene blue under both ultraviolet and solar light irradiation. The morphology of the composite was analysed by X-ray Diffraction analysis and Scanning Electron Microscopy. The results showed that the 1:5 KCC-1@TiO_2 composite has better catalytic activity under UV and sunlight irradiation. The remarkable photocatalytic properties of the 1:5 KCC-1@TiO_2 was attributed to their efficient light harvesting ability and lower recombination rate of electron hole pairs.

OP-22

Effect of Tm^{3+} doping on the properties of sol-gel synthesized SRS phosphor

V. Kavitha and M. Prema Rani

Research Centre and PG Department of Physics, The Madura College, Madurai Tamil Nadu, India

In the present study, different concentrations of Thulium- doped Strontium sulfide nanocrystals were synthesized by the simple and easy sol-gel method. Structural properties were analyzed by powder X-ray diffraction studies and confirmed the monoclinic structure of the sample with the space group of C2/c from the JCPDS data (#PDF830524). Structural parameters were calculated by using PXRD data. The increase in crystallinity value and decrease in lattice strain value doping shows the improvement in crystalline nature due to doping. Surface morphology was analyzed by atomic force microscopy, the AFM images show that the morphology of the sample was enhanced after doping and the average particle size was calculated as 142.02nm. The optical band gap was calculated from a Tauc plot drawn from Diffuse Reflection Spectroscopy data. The optical band gap varies between 3.9eV- 4.0eV based on thulium concentration. Optical properties were analyzed from Photoluminescence spectroscopy and the peaks were obtained in the visible region with a wavelength in the order of ~640nm. The intensity of the peak increases after doping. Thus, thulium doping enhances strontium sulfide's structural, optical, and morphological properties.

OP-23

Structural and morphological analysis of calcium zirconate thin films synthesized by chemical bath deposition method

N. Karthick Kumar and M. Kavitha

Research Centre and PG Department of Physics, The Madura College, Madurai-11, Tamil Nadu, India.

The Calcium Zirconate thin films were synthesized by the chemical bath deposition method on glass plate. Then the samples were annealed for 100°C, 200°C, and 300°C by using muffle furnace. The structural analysis was done by XRD. XRD patterns were compared with JCPDS. The XRD profile was compared and phase purity of the sample was confirmed from, the match (standard data #PDF762401) and the structure of the sample was found to be orthorhombic. From the XRD data, the structural parameters such as grain size, lattice strain, and dislocation density were calculated. The grain size of the samples was increased by raising the annealing temperature. The lattice strain and dislocation density were found to be decrease with increase in annealing temperature. This showed that the crystalline nature of the sample was enhanced by annealing. The surface morphology of the samples was studied from SEM images. The EDAX spectra were taken to confirm the presence of Ca, Zr and O in the sample

OP-24

Synthesis and characterization of highly fluorecent protein protected Pd-Au alloy nanoclusters

P. Pandi Sudha, J. Helen Ratna Monica, Ayyanoth Karthik Krishna Kumar

Organic And Material Chemistry Research Laboratory (OMCRL),

Post Graduate And Research Department Of Chemistry,

The American College, Madurai-625 002, INDIA.

Email:karthikkumar1265 @gmail

Fluorescent alloy nanoclusters are selective and sensitive sensors for detection of various diseases.[1-4] We report a novel synthetic strategy for synthesis of highly fluorescent protein protected Pd-Au bimetallic alloy nanoclusters. The preliminary studies on Pd-Au fluorescent alloy nanoclusters identifies them as promising materials for biomedical applications. The synthesized nanoclusters are characterized using UV-Vis absorption spectroscopy, Emission spectroscopy, Fourier transform infrared spectroscopy (FT-IR), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM-EDX), atomic force microscopy (AFM), and transmission electron microscopy (TEM).

OP-25

Solar energy mediated decomposition of neurotoxic clioquinol over highly active g-C_3N_4-$Sn(WO_4)_2$ heterojunction photocatalysts

B. Sumithra, C. Ramalingan, P. Lakshmanan, D. Geetha

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil, 626126, Tamilnadu, India

Email:sumithrab1998@gmail.com

A facile and mass production method has been developed to facilitate the construction of 2D-C_3N_4/$SnWO_4$ heterojunction photocatalysts. It involves one step thermal exfoliation-deposition technique using bulk carbon nitride and stannous tungstate, in a thermal spreading technique. The prepared catalysts were applied towards solar light-mediated decomposition of neurotoxic clioquinol. Results reveal that, the optimum loading of carbon nitride is 12% and this catalyst completely decompose clioquinol within 80 minutes. At low and high loading leads to inferior performances due to ineffective interfacial contact and formation of bulk-like carbon nitride phase and its encapsulation of stannous tungstate particles respectively. Based on scavenger studies, a plausible mechanism has been proposed and the obtained results have been discussed in the light of characterization.

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OP-26

Various Cu^{+} ion concentration effects on Cu_2S compound system and its real time analysis

[A]k.Sudha, [A*]T.Chitravel, [B*]T. Prem Kumar, [C]R.Sasireka

[A]*Department of Physics, Anna University- University College of Engineering Ramanathapuram Campus, Tamilnadu, India.*

[B]*Department of Physics, Saraswathi Narayanan College, Perungudi, Madurai, Tamilnadu, India.*

[C]*Department of Physics, Srm Valliammai Engineering College, Kattankulathur, Chennai, Tamilnadu, India.*

Email: tcphysics20005@gmail.com, premnobelforum@gmail.com

Copper sulfide semiconductor material (Cu_2S) in both solution form and solid form has many applications in opto-electronics field research. For this reason, we have investigated the Cu_2S compound formation characteristics step by step using the copper sulfate $CuSO_4.XH_2O$ and sodium sulfide Na_2S salt solution. Characterizations such as pH, Electrical conductivity (EC), TDS were carried out. Then optics properties of Cu_2S compound in liquid form were investigated through photo-colorimeter measurements (at various wavelengths including mixed band wavelengths), photo-fluorometer (using various primary and secondary filters) and UV-Vis spectrophotometer (at wavelength range of 300 to 900 nm) measurements were completed. The investigated systematic results will be presented and discussed in the present research report.

OP-27

Synthesis and characterization of calcium phosphate-based magnetic bio-ceramic particles for effective bone regeneration applications

S. Arul Xavier Stango[1]*, U. Vijayalakshmi[2]

[1]*Department of chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishsnankoil-626126.*

[2]*Department of chemistry, School of Advanced Sciences, VIT University, Vellore-632014.*

Email. stangochem@gmail.com

Magnetic calcium phosphate particles were synthesized by co-doped with Fe^{3+} ions using co-precipitation method. Fe incorporated bio-ceramic particles were prepared at varied concentration of X_{Fe} = Fe/(Ca+Fe) from (0 to 5%) with the atomic ratio of 1.67 (Fe+Ca)/P. The synthesized powder was characterized using FT-IR, X-ray diffraction and SEM for confirmation of functional groups, phase, size and crystallinity. The elemental composition of the Fe doped Calcium phosphate bio-ceramic particles were determined using EDAX spectroscopy. In addition, the cytotoxicity, magnetic saturation and hardness of the synthesized Fe doped Ca/P were studied. The SEM images showed the nanocrystalline morphology of the synthesized Fe doped nHAP nanoparticles. The synthesized magnetic particle with each amount of Fe^{3+} ions show excellent blood biocompatibility. The increase in percentage of Fe enhances the magnetization of the prepared bio-ceramic material. The Vickers measurement also shows the increasing trend in the hardness with respect to Fe concentration in Ca/P.

OP- 28

UV light assisted photocatalytic studies of cobalt doped gadolinium oxide nanoparticles

T. Leena Vinolia[1,3] and A. Samson Nesaraj[1,2]*,

[1]*Department of Applied Chemistry,*
Karunya Institute of Technology and Sciences
(Deemed to be University), Karunya Nagar, Coimbatore – 641 114,
Tamil Nadu, India.
[2]*Department of Chemistry, School of Advanced Sciences,*
Kalasalingam Academy of Research and Education (Deemed to be University),
Anand Nagar, Krishnankoil – 626 126,
Tamil Nadu, India.
[3]*Department of Chemistry, CMR Technical Campus, Kandlakoya,*
Hyderabad – 501 401, Telengana State, India.

**E-mail: samson@klu.ac.in*

Metal oxide nanoparticles play a vital role in producing innovative materials that are very efficient in the degradation of chemical contaminants from the environment. Rare-earths-based nanoparticles have promising properties as that of quantum dots. Metal oxides have significant application in the photodegradation of various pollutants in water. When the metal oxides are irradiated with an appropriate wavelength, the electrons present in the VVB get excited to CB, creating holes in the VB. These holes are capable of catalysing the oxidation reactions. In the present work, the photocatalytic behaviour of pure gadolinium oxide (Gd_2O_3) nanoparticles and cobalt doped nanoparticles were studied on the photodegradation of Rhodamine B dye under UV light source for an irradiation period of 80 minutes. Photocatalytic results have shown that the rate of degradation efficiency was enhanced on increasing the concentration of the dopant. Further, the photodegradation efficiency was found to be increased on increased catalyst dosage. The results confirmed that cobalt doped Gd_2O_3 based nanomaterials can be used as an efficient UV light photocatalyst.

OP- 29

Effective photocatalytic degradation of orange G dye by Mn-Co co-doped ZnO nanoparticles

K. Elizabeth[1] and A. Samson Nesaraj[1,2*]

[1]*Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Karunya Nagar, Coimbatore – 641 114, Tamil Nadu, India.*
[2]*Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Anand Nagar, Krishnankoil – 626 126, Tamil Nadu, India.*
**E-mail: samson@klu.ac.in*

In this study, Mn-Co co-doped ZnO ($Zn_{1-x-y}Co_xMn_yO_{1-\delta}$, where x=y=0.05, 0.10, 0.15, 0.20, 0.25) nanostructured materials were prepared using facile chemical precipitation method. Photocatalytic degradation of aqueous solution of Orange G dye under UV light illumination was studied using the synthesized materials as photocatalysts. The structural, morphological and optical properties of the catalysts were studied by X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), Energy Dispersive X-ray (EDX), Scanning Electron Microscope (SEM), Brunauer Emmett and Teller (BET) surface area analysis, Transmission Electron Microscope (TEM) and UV-visible spectroscopic techniques. Among the five concentrations of Mn-Co co-doped ZnO studied, 25 mol% Mn-Co co-doped ZnO nanoparticles have exhibited better photodegradation efficiency (80.13%) in degrading the Orange G dye present in water within 150 minutes under UV light irradiation. The operational parameters such as, effect of dye concentration, amount of catalyst and effect of pH with respect to dye degradation using the optimized 25 mol% Mn-Co co-doped ZnO nanoparticles were also studied. Under the optimum condition (catalyst loading- 0.02g/L, dye concentration- 45ppm and pH- 2.5), 90.35% dye removal was achieved after 150 minutes of UV light irradiation.

PP-01

Preparation of fingerprint developing powder from dry pomegranate seed powder

T. A. Akshara

Kalasalingam Academy of Research and Education, Forensic science department, Krishnankoil, TamilNadu, India.

Email: aksharaajithan2602@gmail.com

As fingerprint is an integral part of policing and forensic science. As the urge to develop a latent or invisible print from a scene of crime using different methods are also increasing. According to the surface and background texture the development of fingerprint differs with the colour and nature of powder in dusting and other chemical methods. In the operational visualisation method, the use of commercially available traditional black/ white powders are used to develop latent fingerprint from the surface. This project proposes eco-friendly, cost efficient, innovative powder dusting method using dry pomegranate (Punica granatum) seed powder which does not create any allergic disorders in the person using this as well as the nonporous surface it is used. Therefore, in a nutshell this study may give further references to the exploration in operational visualisation method.

PP-02

Ultrasonic studies on lemon grass biodiesel – diesel mixtures

P.TANU SRI[1], K.VAGDEVI[1], K.ASRITHA[1] and M.S.REVATHY[2]

[1]Department of Computer science engineering, Kalasalingam Academy of Research and Education,Srivilliputhur,Tamil Nadu

[2]Department of Physics in kalasalingam Academy of Research and Education,Srivilliputhur,Tamil Nadu,India

Biodiesel fuel exhibits similar chemical and thermodynamic properties to that of petroleum diesel fuel and hence it is of particular interest to study the molecular association in biodiesel+diesel mixtures. In this regard, the values of sound velocity, density and viscosity were measured at 303 K in the system of biodiesel (Lemon grass oil) and diesel. Some of the acoustical parameters such as adiabatic compressibility, free length, free volume and internal pressure were calculated and are interpreted in terms of molecular interaction between the components of the mixtures. The deviations of the sound velocity from the experimental values were obtained and it was found to be the best suited to act as biodiesel+diesel mixture. The pressure of strong interactions was also confirmed in the binary system.

PP-03

Fractional restrained domination

P.Vijayalakshmi

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur -626126.

Let G be a graph with a set of V vertices and a set of E edges. A function f: $V \rightarrow [0, 1]$ is called a restrained dominating function(RDF) of G if for every $v \in V$,$f(N[v]) = \sum_{u \in N[v]} (deg(u) - 1)f(u) \geq 1$. A restrained dominating function f of a graph G is called minimal (MRDF) if for all functions $g : V \rightarrow [0, 1]$ such that $g < f$ and $g(v) \neq f(v)$ for at least one $v \in V$, g is not a RDF. The fractional restrained domination number $\gamma_{fr}(G)$ is defined as follows: $\gamma_{fr}(G) = \min\{|f| : f$ is an MRDF of $G\}$ where $|f| = \sum_{u \in v} f(v)$.

PP-04

Applications of anova in mineral processing

S. Shanmathi[1], S. Jeganpandi[1] and M. Kameswari[2]

[1]*Department of Biotechnology, School of Bio, Chemical and Processing Engineering, Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur - 626126.*

[2] *Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy ofResearch and Education, Krishnankoil, Srivilliputhur - 626126.*

The article provides an ANOVA analysis plan that can be used to analyse a variety of complicated events in a variety of scientific domains. It is concerned primarily with the display of various statistical model application areas, mainly in mineral engineering. This paper proposes several trials where ANOVA was successfully used to analyse the attributesof three types of coal and the flotation process. Different features distinguish mineral resources, and the flotation process depends on a number of variables that must be carefully regulated to achieve the process' anticipated separation efficiency under industrial settings. These data persuade the complication of mineral processing structures. By adapting the approach to the characteristics of the event being determined, ANOVA was the method of choice. This study shows that the variance calculation is appropriate for taking into account problems pertaining to mineral engineering. Examples given in the paper supported the notion that ANOVA has a large amount of potential. But it should still be emphasized that there are numerous drawbacks to one-dimensional analysis of variance.

PP-05

Breast cancer survival prediction using knowledge discovery in databases

P. Padhma Priya[1], V. Pavithra[1] and M. Kameshwari[2*]

[1] Department of Biotechnology, School of Bio, Chemical and Processing Engineering, Kalasalingam Academy of Research and Education, Krishnankovil, 626126 Tamilnadu, India.

[2]Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education. Krishnankovil, 626126 Tamilnadu, India.

The medical research community has been granted the chance to create survival prediction models owing to the accumulation of massive amounts of medical data. Knowledge discovery in databases (KDD) is a technique used by medical researchers to find and extract hidden patterns and relationships among a huge number of variables and forecast the course of a disease. In order to create predictive models and learn more about the connections between particular predictor variables and survival in the setting of breast cancer, the study was carried out. It is a cross-sectional study.

PP-06

Applications of ANOVA in malarial disease

G. Abishak and M. Kameswari

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Srivilliputhur, Krishnankoil -626126.

Article provides an ANOVA an analysis plan that can be used to analyse a variety of complicated events in a variety of scientific domains. It is concerned primarily with the display of various statistical model application areas, mainly in mineral engineering. This paper proposes several trials where ANOVA was successfully used to analyse the attributes of three types of coal and the flotation process.. These data persuade the complication of mineral processing structures. Admission records are seldom used in sub-Saharan Africa to delineate hospital catchments for the spatial description of hospitalised disease events. We set out to investigate spatial hospital accessibility for severe malarial anaemia (SMA) and cerebral malaria (CM). Malaria admissions for children between 1 month and 14 years old were identified from prospective clinical surveillance data recorded routinely at four referral hospitals covering two complete years between December 2015 to November 2016 and November 2017 to October 2018. From 5766 malaria admissions, 5486 (95.14%) were linked to specific EA address, of which 272 (5%) were classified as cerebral malaria while 1001 (10%) were severe malaria anaemia. Further, results suggest a marked geographic catchment of malaria admission around the four sentinel hospitals although the extent varied. The relative rate-ratio of hospitalisation was highest at< 1-hour travel time for SMA and CM although this was lower outside the predicted hospital catchments.

PP-07

A study on milling of glass fiber reinforced plastics manufactured by hand-lay up using statistical analysis (ANOVA)

S. Yogesh Naren[1], S. Abinath Raja[2] and M. Kameswari[3]

Department of Mechanical Engineering, School of SAME
Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur-626126.
Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur -626126.

Milling is the most practical machining (corrective) operation for removing excess material to produce a well-defined and high-quality surface. However, milling composite materials presents a number of problems such as surface delamination associated with the characteristics of the material and the cutting parameters used. In order to minimize this problem is presented a study with the objective of evaluating the cutting parameters (cutting velocity and feed rate) related to machining force in the workpiece, delamination factor, surface roughness and international dimensional precision in two GFRP composite materials (Viapal VUP 9731 and ATLAC 382- 05). A plan of experiments, based on an orthogonal array, was established considering milling with prefixed cutting parameters. Finally, an analysis of variance (ANOVA) was preformed to investigate the cutting characteristics of GFRP composite materials using a cemented carbide (K10) end mill.

PP-08

Optimisation of bio-fuel production using ANOVA

J. Mariya Sneha Rani[1], S. Anitha[1], M. Drose Ignatious Shane[1] and M. Kameswari[2]

[1] *Department of Biotechnology, Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur-626126.*

[2] *Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, Srivilliputhur -626126.*

The present study investigates the extraction of lignin from rice straw by bi-directional delignification methodology through minimal energy input towards feedstock preparation for bio-fuel production. In the first stage, the rice straw was treated with sodium chlorite of pH 5.5 followed by sodium hydroxide while in the second stage with sodium hydroxide alone under controlled parameters like, concentration, time and temperature at constant liquor-to-solid ratio. The process was mathematically modelled using central composite design approach and optimized by quadratic regression model with ANOVA (analysis of variance) for showing the relative significance of the factors. The percentages of delignification in two different optimized routes were estimated to be 77.84 and 44.09 respectively. The loss of feedstock in terms of glucose concentration was measured to be 4.23 and 2.51% in the preceding two-stages. Hence, this dual route method well-supported by the impressive experimental results could be promising technique of delignification of rice straw for bio-fuel generation.

PP-09

Synthesis and structural, optical analysis of strontium zirconate thin films by chemical bath deposition method

A. Riyaz ahmed, B. Krishnaveni, N. Karthick Kumar and M. Kavitha

Research Center and PG Department of Physics, The Madura College, Madurai-625011, India.

The Strontium Zirconate ($SrZr0_3$) thin film was coated on glass plate by chemical bath deposition method. Then the samples were annealed for 100˚C (Sample-B), 200˚C (Sample- C) for one hour with muffle furnace. They were compared with the sample which doesn't annealed (sample- A). The structural characterization was done by XRD. The XRD pattern was compared with JCPDS. The XRD profile matches with the standard data #PDF742231 and it confirmed cubic structure of the sample. From the XRD data, the structural parameters such as grain size, lattice strain, and dislocation density were calculated. UV-Vis spectroscopy was used to find the band gap of the sample. Tauc plot was drawn using UV absorption data and the indirect band gap was found to be 3.5eV and got increased with annealing. Surface morphology was studied from SEM analysis and presence of Strontium, Zirconium, and Oxygen were confirmed from EDAX analysis.

PP-10

Facile synthesis of α-aminophosphonatederivatives *via* 1,5- dial glycosides: A $FeCl_3$ catalyzed novel reaction

R. Shobana, M. Mani Bharathy, J. Helen Ratna Monica and

Ayyanoth Karthik Krishna Kumar*

Organic and Material Chemistry Research Laboratory

PG & Research Department of Chemistry

The American College, Madurai, India

Email:karthikkumar1265@gmail.com

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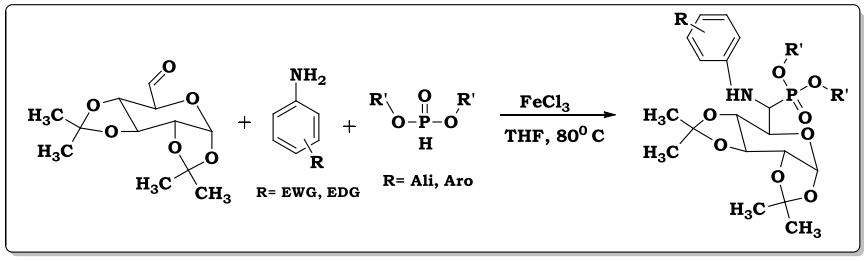
The α-aminophosphonates are an important class of organophosphorus compounds possessing variable and interesting biological properties.[1] Some of these biological properties to mention are enzyme inhibitory, anti-tumor, anti-biotic, and anti-proliferative activities.[2,3] Since last decade, few facile and efficient procedures have been developed for the synthesis of α-aminophosphonates.[4] We report a facile and friendly synthetic route for the synthesis of α-aminophosphonates in one pot system using dialkyl phosphite, amines and 1,2,3,4-di-*O*-isopropylidine-α-D-galacto-hexaodialdo-1,5-pyranose. A highly efficient ferric chloride is used as a Lewis acid catalyst for the generation of carbonyl carbocation. The synthesized compounds have been characterized using elemental analysis, ESIMS, ^{1}H NMR & ^{13}C NMR.



PP-11

Assessment of groundwater quality in and around tiruchirappalli district, tamil nadu

H. Mohamed Althaf Hussain*, S. Mohammed Shajahan, R. Abdul Vahith, J. Sirajudeen and J. Muneer Ahamath

PG & Research Department of Chemistry, Jamal Mohamed College (Autonomous), Affiliated to Bharathidasan University, Tiruchirappalli.

Groundwater samples were collected from different locations in and around Tiruchirappalli district and analyzed for their physico-chemical characteristics. Fourteen groundwater samples were collected from various areas are located the proximity during the period of January 2023. The present investigation is focused on the determination of physico-chemical parameters such as pH, Electrical Conductivity, Total Dissolved Solids, Dissolved Oxygen, Biochemical Oxygen Demand, Chemical Oxygen Demand, Calcium, Magnesium, Alkalinity, Total Hardness, Temporary Hardness, Permanent Hardness, Chloride, Sulphate, Sodium and Potassium. Groundwater suitability for drinking, domestic and irrigation purposes was examined by using WHO and BIS standards.

PP-12

Structural and optical study of copper oxide nanoparticles by chemical precipitation method

S. Angayarkanni, S. K. Harish Balaji and G.Arun

The Madura College, Madurai

Nanoparticles are effective material for modern day technology. Copper oxide (CuO) nanoparticles are synthesized by chemical precipitation method using copper nitrate as a precursor and NaOH as a stabilizing agent. This synthesis provides a large-scale production of CuO nanoparticles easily. The prepared samples are characterized to evaluate structural and optical property. X-ray diffraction pattern (XRD) reveals the monoclinic crystal structure. Scanning electron microscopy (SEM) showed the morphology of as prepared CuO nanoparticles. The band edge-absorption peak is found to be at 320 nm.

PP-13

Green synthesis of TiO_2 nanoparticles using Brassica juncia seeds extract

S. Jeyaraj and A. Mary Saral*

Department of Chemistry, School of Advanced Sciences, Vellore Institute of Technology (VIT), Vellore - 632 014, Tamil Nadu, India.

In this work, we investigate the antibacterial and antifungal properties of synthetic nanoparticles of titanium dioxide (TiO_2) by synthesizing them utilizing extract from the seeds of the Brassica juncea plant. In order to learn more about the green produced TiO_2 nanoparticles, a number of spectroscopic and microscopic methods were used. First and foremost, an Ultraviolet visible (UV-vis) spectrophotometer was used to evaluate the absorption spectra of produced TiO_2 nanoparticles. Fourier transform infrared (FTIR) spectroscopy was used to investigate the functional groups bound to the TiO_2 nanoparticles and the seeds extract. X-ray diffraction (XRD) analysis was used to look into the crystalline structure of nanoparticles. The Field Emission Scanning Electron Microscope (FE-SEM) was used to look at the morphological features. The synthesized TiO_2 nanoparticles were found to be extremely toxic against variety of microorganisms, including bacteria such as Bacillus subtilis (B. subtilis), Escherichia coli (E. coli), Enterococcus faecalis (E. faecalis), Klebsiella pneumonia (K.pneumoniae), Staphylococcus aureus (S. aureus), and the fungal strains are Aspergillus flavus (A. flavus), Aspergillus niger (A.niger).The disc diffusion test was used to calculate the size of the inhibitory zone

PP-14

Experimental and theoretical investigation of oxalate as corrosion inhibitor for mild steel in acid/chloride/ sulphate medium

L.Jayalakshmi* and K.Dhahagani

Department of Chemistry, Sethu Institute of Technology, Kariapatti, Tamilnadu, INDIA.

Email: jayalakshmiklu@gmail.com

The corrosion and inhibition behaviour of Mild Steel in Acid, Chloride, Sulphate in the presence of Oxalate were investigated using weight loss method at 35 and 55^{o}c. It was found that the inhibition efficiency increased with Oxalate concentration but decreased with increase in temperature. A synergistic effect was observed in Oxalate. The experimental results suggest that the presence of Oxalate ions in the solutions stabilized the adsorption of Oxalate molecules on the metal surfaces and, therefore improve the inhibition efficiency. Phenomenon of physical adsorption is proposed for the inhibition and the process followed the Langmuir adsorption isotherm and kinetic / thermodynamic model of elawady et al. The mechanism of adsorption inhibition and type of adsorption isotherm were proposed from the trend of inhibition efficiency with temperature, E_a, ΔG_{ads}, and Q_{ads}. To further explain the adsorptive behaviour of the molecules on the Mild Steel surface. Inhibitor adsorption characteristics were approximated by Langmuir adsorption isotherm at all the concentrations and temperatures studied. The mechanism of physical adsorption is proposed from the trend of inhibition efficiency with temperature and from the calculated values of Gibbs free energy, activation energy and heat of adsorption.

PP-15

Synthesis of zinc oxide nano particles by *pergularia daemeia* and their characterization studies

T. Maruthavanan[1], S. Gnanavel[2] and R. Kannan[3]

[1]*Department of Chemistry, Sonastarch, Sona College of Technology, Salem – 636 005.*

[2]*Chemkovil, Research and Project Development Centre for Chemical and Biological Sciences, Mettur Dam, Salem – 636 402*

[3]*Department of Chemistry, Sri Kumaraguruparaswamigal Arts College, Srivaikuntam, Thoothukudi Dt.*

*Email:*drt.maruthavanan@gmail.com

Synthesis of Nano materials attracts the researchers to carry out the work in different methodology from various sources. Nano materials have unique properties such as large surface area, hardness, optical activity, strength, catalytic activity etc. Due to this, they are being utilized in various applications in various domains. Even though there are several physico-chemical methods are available, green synthesis plays an important role due its eco-friendly approach and naturally available resources as precursors. So, stick on to this concept, we made an attempt to synthesize zinc oxide nano particles using plant extract. The synthesized nano particles were characterized through infrared spectra, X ray diffraction studies and scanning electron microscope techniques.

PP-16

Synthesis of (Z)-N-(4-acetyl-2-alkyl-3,5-diarylcyclohexylidene)-4-methyl-1,2,3-thiadiazole-5-carbohydrazide

U.Surya and T.Balasankar

Department of Chemistry, Annamalai University

The structures of the newly synthesized (Z)-N-(4-acetyl-2-alkyl-3,5-diarylcyclohexylidene)-4-methyl-1,2,3-thiadiazole-5-carbohydrazide were confirmed by spectral and elemental analysis. The difference in the potency of activity against various free radicals, human cancer cells and microbial strains has been evaluated by SAR. Compound with electron donating substitutions at the para position of the phenyl showed excellent free radical scavenging effects. In the tested compounds, Electron withdrawing fluoro, chloro and bromo substitution at the para position of the phenyl ring attached to C-3 and C-5 Carbons of the piperidine moiety outperformed cytotoxic and antimicrobial activities. Our findings suggest that the antioxidant, antitumor and anti-microbial activities of compounds create promising leads for the development of potent anti-tumor and anti-microbial agents.

PP-17

Crystal structure, Hydrogen bonding and conformational analysis of 4'-(4-Bromophenyl)-5"-chloro-1'-methyl-1-phenyl-6,7-dihydrodispiro [indazole-5,3'-pyrrolidine-2',3"-indoline]-2",4(1*H*)-dione

C. Selva Meenatchi[a], R. Vishnu Priya[b] and J.Suresh[b]

Research student, Department of physics, The Madura College, Madurai

Associate professor, Department of Physics, The Madura College, Madurai

Email: arani.selvameenatchi@gmail.com

The crystal structure of 4'-(4-Bromophenyl)-5"-chloro-1'-methyl-1-phenyl-6,7-dihydrodispiro [indazole-5,3'-pyrrolidine-2',3"-indoline]-2",4(1*H*)-dione has been elucidated. The crystal is crystallized in the monoclinic system with the space group $P2_1/c$. The crystal data are given as follows:

Molecular Formula: $C_{30}H_{24}N_4O_2BrCl$		Molecular Weight: 587.9g mol^{-1}		
a	b	c	β	
11.751(5) Å	11.268(4) Å	19.820(9) Å	91.47(2)°	
V	Z	Dx	μ	λ
2623.6(19) $Å^3$	4	1.488 g cm^{-3}	1.705 mm^{-1}	0.71073 A°

The structure is solved by direct methods and the structure is refined to final R-values of R = 0.0538 and wr2 = 0.1230 respectively. In the title compound, the central six membered cyclohexane ring C1- C6 has envelope conformation with C2 atom being the flap atom. The pyrrolidine ring C1/C14/C21/C22/N3 has envelope conformation with N3 as flap is observed. The centrosymmetric dimers are connected through an intermolecular N(4)---H(4)…N(3) interaction leading to

a chain C(5) motif. The title compound is synthesized as a single crystal and its structure is refined. Conformations of the rings are analysed using puckering parameters. The hydrogen bond formation in the structure is studied.

PP-18

Design and development of naphthyl based fluorescent chemosensors for the detection of metal analytes

M.Akilesh , G.Narmatha , Dr. J. Prabhu and Dr. R. Nandhakumar*

Fluorensic Materials Laboratory, Department of Applied Chemistry,
Karunya Institute of Technology and Sciences
(Deemed to be University)
Coimbatore - 641114
EMail: nandhakumar@karunya.edu

The recognition and sensing of the biologically and environmentally important metal ions have emerged as a significant goal in the field of chemical sensors in recent years. Fluorescence has been a powerful tool due to its simplicity, high detection limit and application to bioimaging. Fluorescence sensing is a diverse and challenging field of research. Fluorescence methods are now very popular and economic and are now actively used in cellular imaging, DNA sequencing, flow cytometry and clinical diagnostics. 2-Hydroxy-1-naphthaldehyde is here demonstrated to be such a versatile fluorescent building block for the design and development of numerous sensors for a variety of analytes. Different Chemosensors can be designed with 2-hydroxy-1-naphthaldehyde and can show the interestingly different types of emission and absorption colour by recognizing the different analytes. In this work we designed a new chemosensor with 2-Hydroxy-1-Napthaldehyde as a fluorophore and an aliphatic chained Bromo compound as a linker. The synthesized chemosensor was characterised with

NMR, IR, MASS spectrometry. The Chemosensor was also subjected to UV and Fluorescent Studies.

PP-19

Development of naphthol based fluorescent chemosensors for metal ion detection

A.Athira, A.Elizabeth, Dr. J. Prabhu* and Dr. R. Nandhakumar*

Fluorensic Materials Laboratory, Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Coimbatore - 14

E mail: prabhuj@karunya.edu, nandhakumar@karunya.edu

There has been an extensive use of fluorescent chemosensors for ions and neutral analytes in a wide range of disciplines. Chemosensors have a very promising applications in both established and emerging biotechnologies. Naphthols are one of polycyclic aromatic hydrocarbons that are widely used as organic raw materials for the synthesis and production of drugs, pesticides, dyes, plastics, and rubbers. A fluorescent based chemosensor was developed via simple elimination reaction between 2-Naphthol and 1,3-Dibromopropane.We were able to produce a ligand that can detect metal ions. For the synthesized compound, characterization experiments employing NMR and IR were carried out. To find out which metal may sense we undergone UV and fluorescence studies using various metal ions. All the studies will be presented.

PP-20

Naphthyl based fluorescent chemosensors for the detection of metal ions

S.Kavanya, G.Narmath, J. Prabhu* and R. Nandhakumar*

Fluorensic Materials Laboratory, Department of Applied Chemistry,
Karunya Institute of Technology and Sciences
(Deemed to be University)
Coimbatore - 641114
Email: nandhakumar@karunya.edu

Fluorescent chemosensors have become an important research field of supramolecular chemistry and have attracted great attention because of their simplicity, high selectivity and sensitivity in fluorescent assays. 1′-hydroxy-2′-acetonaphthone (HAN) is an interesting ESIPT probe that has attracted immense attention of the researchers due to its controversial ESIPT character. Present understanding reveals that HAN exists in its prototaumeric enol (E) form in the ground state where strong intramolecular hydrogen bond exists between the proton donating naphtholic OH group and proton accepting carbonyl CO group. Upon photoexcitation, HAN undergoes an ultrafast ESIPT reaction, leading to the conversion of the initially excited enol form (E*) to a keto type prototautomer (K*) almost quantitatively. In this work, a naphthyl based sensor on 1-hydroxy 2-acetonaphthone with ortho, meta and para dibromoxylene was designed and characterized by ^{1}H NMR, ^{13}C NMR, IR and Mass spectrum. It was investigated by UV-Visible and fluorescence spectroscopy. All these studies will be presented.

PP-21

Uryl based fluorescent chemosensor for the detection of metal ions and its applications

J. Wilson Raphel, A. Elizabeth and R. Nandhakumar

Fluorensic Materials Laboratory, Department of Applied Chemistry
Karunya Institute of Technology and Sciences
(Deemed to be University)
Coimbatore –641114, India
Email: nandhakumar@karunya.edu

Fluorescent chemosensors are organic or inorganic moiety used for sensing ions and neutral analytes in a variety of disciplines, including biology, physiology, pharmacology, and environmental sciences. Rapid advancement of Fluorescent Chemosensors for the recognition of cations as captivated notable attention of researchers because of their great selectivity, high responsivity, low detection limit and naked eye recognition. The development of sensors for metal ion in solution as always been of particular importance for cations with biological and Environmental. In this work a simple Thiourea based Chemosensor probe (ACO) has been designed, Synthesised, successfully characterized by H^1, $C^{13,}$ Mass, and IR spectroscopy. The ACO was synthesized in one step reaction which is kept in room temperature with stirring for 16 hours. The sensing behavior towards various metal ions (Ag2+,Hg2+,Cu2+,Co2+,K2+,Al3+,Fe2+,Fe3+etc.,) is investigated by UV- visible and fluorescence spectroscopy. All these details will be presented.

PP-22

Structural analysis of nickel oxide (NiO) nanostructured thin films

Penila Saminy. P and S. Sonia*

Research Scholar, Department of Physics (Reg. No. 20213042132009), Holy Cross College (Autonomous), Nagercoil-629004, Tamil Nadu, India.
(Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli, Tamilnadu, India)
Email: sonia.s@holycrossngl.edu.in

One of the intriguing P-type semiconductors is nickel oxide. In the present study, NiO thin films are made using the flexible SILAR technique. It is a unique method by which thin films of semiconductors can be deposited alternately dipping the substrate into the cationic and anionic aqueous solutions to develop nickel oxide thin films on a glass substrate, followed by two hours of annealing at 400°C. The morphological and structural characteristics were done by using X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy-dispersive X-ray (EDX) techniques to describe the properties of thin films.

PP-23

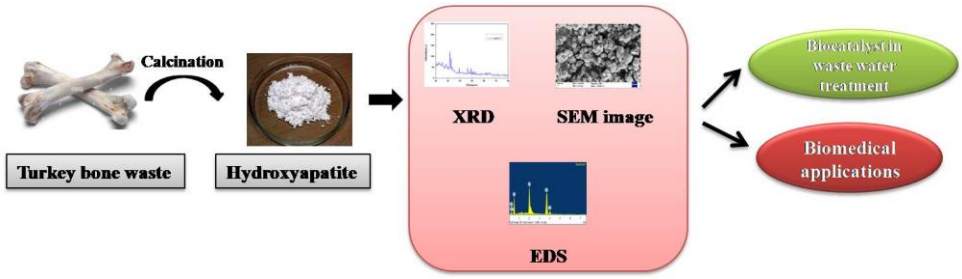
Structural morphological and compositional studies of hydroxyapatite from bone waste

V. Bhuvaneshwari and S. Sonia *

Department of Physics (Reg. No. 20213042132007), Holy Cross College, Nagercoil, Affiliated to Manonmaniam Sundaranar University, Tirunelveli-627012, Tamil Nadu, India.

Email: sonianst@gmail.com

Novel biomaterials are being developed through a process of advances in science, and they are fascinating due to their bioactivity and biocompatibility. The bioceramic Hydroxyapatite, which belongs to the calcium phosphate (CaP) family and has a Ca/P ratio of 1.67, is one such example of a biomaterial. In this work, Hydroxyapatite produced from turkey bone wastes using heat treatment. Structure, morphology and elemental composition of the material was studied using XRD, SEM and EDX. Interestingly, HA from bone also has a significant positive impact on the environment because it significantly reduces pollution.



PP-24

Fabrication of novel rice-like $CoMoO_4$ nanoparticles decorated with GO; an efficient visible light candidate for the degradation of organic moiety

K. Leeladevi[a] and E.R. Nagarajan[b]

[a]*Department of Chemistry, Sri S.Ramasamy Naidu Memorial College, Sattur 626203, Tamil Nadu, India.*

[b]*Department of Chemistry, Nanomaterials Laboratory, IRC, Kalasalingam Academy of Research and Education, Krishnankoil 626 126, Tamil Nadu, India.*

Herein, we report the preparation of rice-like $CoMoO_4$ nanoparticles decorated with GO ($CoMoO_4$/GO) through straightforward hydrothermal method. As prepared $CoMoO_4$/GO nanocomposite were characterized by various analytic and spectroscopic techniques. The optical property of the $CoMoO_4$/GO nanocomposite was predicted by Diffuse Reflectance Spectroscopy (DRS) analysis; this confirms the active region of the as prepared $CoMoO_4$/GO nanocomposite. The catalytic application of the composite was examined by the degradation of ciprofloxacin drug and methylene blue dye under the irradiation of visible light. The rice-like $CoMoO_4$/GO nanocomposite shows appreciable catalytic activity towards the degradation of both Ciprofloxacin drug and Methylene blue dye with 93 and 97 % efficiency within 90 and 40 min respectively. Besides that, nanocomposite exposed commendable photocatalytic stability and reusability even after fifth repeated consecutive cycles. This study introduces a dual role binary metal oxides nanocatalyst for environmental applications.

PP-25

Gemstone identification using a portable raman spectrometer.

K[1].Dhanabalan , A. R[2]. Venkatasudhan, Ambati Poli Reddy[2], P[2].Bhuvanan, Medisetty Sreedeep[3], M[4].Karthikeyan, Trinity Blessy[5], M.S.Revathy[6] and J.Naidu Dhanpal[6]

[1]Department of biotechnology, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu, India

[2]Department of Computer science engineering, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu

[3]Department of Electronics and Communication Engineering, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu, India

[4]Department of Food Technology, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu, India

[5]Department of biomedical, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu, India

[6]Department of Physics, Kalasalingam Academy of Research and Education, Srivilliputhur, Tamil Nadu, India

Over the past few years, stones with dubious origins have proliferated on the gemstone market. It is frequently impossible to determine whether a gemstone is real or fake, even after careful examination by a qualified jeweler. In the worst situation, even sophisticated analytical techniques have trouble telling changed diamonds apart, which is extremely worrying for the global gemstone sector. For the analysis of marketable gemstones, Raman micro-spectroscopy is the best technique. Raman analysis is perfect for analyzing even high-value stones because it requires no sample preparation and is non-destructive. In the present work we have identified the genuineness of different gemstone based on the Raman spectrum data's. Raman spectrum of samples recorded at scan rate with laser power 785nm. The results for Cat's Eye stone, Diamond stone, and Hessonite

stone indicate raman peak values at 926.264 cm^{-1}, 1520.712 cm^{-1}, and 883.624 cm^{-1}, respectively; however, the authenticated raman spectra peak values for the aforementioned gemstones are 1045.236 cm^{-1}, 1320.543 cm^{-1}, and 705.532 cm^{-1}. Hence, Raman spectroscopy can also give a gemstone its own fingerprint, making it possible to spot any future alterations. This research may help us better comprehend the vibration of molecules in gemstones.

PP-26

Separation and identification of organic dye molecule by combining SERS and thin layer chromatography

D. Yamuna, R. Sathishkannan and B. Sundaravel

Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil 626 126, Tamilnadu, INDIA.

Email:sathishkannan@klu.ac.in

In this study, by coupling Surface-Enhanced Raman Spectroscopy (SERS) with thin layer chromatography (TLC) a facile and powerful method was developed for the isolation and identification of organic dye molecules from a complex mixture. A TLC plate made of a porous stationary phase composed of fibrous silica oxide which shows excellent SERS enhancement and eluent migration. The sample containing a mixture of dyes like methylene blue, rhodamine B and methyl orange of was spotted on the TLC plate. Adopting a common TLC development method, the TLC was developed and then coated with Ag nanoparticle. Then the TLC plate was examined with SERS. This method detects dye molecules of concentration as low as 10 ppm.

PP-27

Fuzzy based clustering on breast cancer data using two different similarity measures

M.Kameswari[1], T.K.Barath Rishi[2] and S.Kavitha[3]

[1]*Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626126.*

[2]*M.Tech Biotechnology (1st Year Student), Department of Biotechnology, School of Engineering and Technology, Bharathidasan University, Trichy* - 620024.

[3]*Department of Mechanical Engineering, Kalasalingam Academy of Research and Education, Krishnankoil -626126.*

Email: m.kameswari@klu.ac.in, barathtkbr02@gmail.com, skavitha@klu.ac.in

Clustering is a unsupervised technique in Machine Learning that involves grouping similar data points. Given a set of data points, we can use a clustering algorithm to classify each data point into a specific group. In medical field, we often encounter situations to classify similar group of patients for serious diseases such as cancer. Data points possess attributes. Mostly attributes are linguistic in nature. Fuzzy mathematics helps to convert linguistic variable to appropriate numeric values. Fuzzy clustering is an alternative method to conventional /hard clustering algorithms which makes partitions of data containing similar subjects. In this paper, a cluster analysis method based on fuzzy equivalence relation on the breast cancer data set taken from the repository is proposed. Also in this article, we use normalized fuzzy Canberra distance measure and Euclidean distance measure for similarity measure.

PP-28

Visible light active cerium doped CdS sub-10 nanoparticles decorated reduced graphene oxide nanocomposites for the photocatalytic application

P. Devendran*,[1], N. Nallamuthu,[2] and M. Krishna Kumar,[3]

[1] *Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil – 626126, INDIA.*

[2] *Dayananda Sagar of Academy of Technology and Management, Uthayapura, Bangalore - 560082, INDIA.*

[3] *Department of Physics and Electronics, CHRIST (Deemed to be University) Bangaluru-560 029, Karnataka, INDIA.*

**Email: p.devendran@klu.ac.in*

Cerium doped cadmium sulfide (Ce-CdS) grafted reduced graphene oxide (G) sheet nanocomposites estimated imperative attention due to their visible light-driven, tunable band gap and high surface to volume ratio were investigated for the photocatalytic degradation of cationic dye from aqueous solution. The formation of wurtzite (hexagonal) crystal structures of cadmium sulfide nanoparticles (NPs) was confirmed by XRD spectra and the average crystallite size was determined to be 8 ± 2 nm. HRTEM analysis confirmed the homogeneous distribution of Ce-CdS NPs over the G sheets. The photocatalytic behaviour of the Ce-CdS decorated G sheets was studied using a textile dye methylene blue (MB) under sunlight. The result indicates that the Cerium-cadmium sulfide-reduced graphene oxide (Ce–CdS-G) shows highest MB degradation of 99.0 ± 0.4% within 90 min under sunlight. The catalytic activity was retained over 80% of its original value even after four successive runs and the present method can be employed for the large-scale synthesis of RE-CdS-G nanocatalyst.

PP-29

Numerical simulation for dynamical model of interpersonal and romantic relationships using intuitionistic fuzzy values

K Thangapandi[1] and S Narayanamoorthy[2]

[1]*Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be university), Anand Nagar, Krishnankoil- 626126.*

[2]*Department of Mathematics, Bharathiar University, Coimbatore - 641046.*

This work is to study a system of fractional differential equations to describe interpersonal and romantic relationships. The dynamical model of interpersonal and romantic relationships has many uncertainties as dynamical system parameters, as well as in the initial conditions. The intuitionistic fuzzy values are taken into account uncertain parameters and depict the numerical simulation for the model for interpersonal and romantic relationships. Moreover, the existence and uniqueness of the system of solution of the model is derived. Finally, the numerical results are discussed elaborately to justify the intuitionistic fuzzy values.

PP-30

Surfactant effects on the synthesis of ($SnWO_4$) nanoparticles and their application as a recyclable catalyst for the degradation of toxic drug

D. Geetha, B. Sumithra, P. Manorama

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Anand Nagar, Krishnankoil – 626 126, Tamil Nadu, India.

geetha.d@klu.ac.in

A hydrothermal method successfully developed the green synthesis of $SnWO_4$ nanoparticles using various surfactants. This method resulted in the formation of spherical, microcrystalline $SnWO_4$ nanoparticles with an average size of ~4.0 - 10 nm. The role of cationic and non-ionic surfactants, in the synthesis of $SnWO_4$ nanoparticles, will investigate. In this reaction, surfactants act as capping agents. The addition of a surfactant leads to the formation of spherical and microcrystalline $SnWO_4$ nanoparticles. An increase in band gap energy is observed with a decrease in particle size because of the three-dimensional quantum confinement effect shown by synthesized $SnWO_4$ nanoparticles in their electronic spectra. The synthesized $SnWO_4$ nanoparticles were characterized by transmission electron microscopy (TEM), selected area electron diffraction (SAED), and Fourier-transformed infrared spectroscopy (FT-IR). The optical properties will investigate using UV-visible spectroscopy. The synthesized $SnWO_4$ nanoparticles act as an efficient photocatalyst in degrading toxic drugs under direct sunlight.

PP-31

Solvents effect on nano sized nickel tungstate synthesis for energy storage application

K. R. Nagavenkatesh, C. Sambathkumar and P. Devendran*

[1] *Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil-626 126, Tamil Nadu, INDIA.*

** Email: pdevavenmani@gmail.com, p.devendran@klu.ac.in*

Nickel tungstate ($NiWO_4$) was prepared by a simple solvothermal method with two different solvents as Poly Ethylene Glycol (PEG-400) and Ethylene Glycol (EG). The structural studies were confirmed by X-ray diffraction. The functional and vibrational groups of the prepared material were confirmed by FT-IR and Raman spectroscopy. The scanning electron microscopy images associated with energy-dispersive analysis confirmed the formation of nano-grain morphology and elemental composition of the prepared material. The PEG and C-TAB solvents during the $NiWO_4$ synthesis exemplifies different role and the results are discussed. The entire electrochemical studies are also performed using cyclic voltammetry (CV), galvanostatic charge-discharge (GCD), and electrochemical impedance spectroscopy (EIS). From the electrochemical study, the $NiWO_4$electrode was found to possess notable specific capacitance and $NiWO_4$–PEG (NW-P) nano-grain particles exhibit a specific capacitance of 348.434 Fg^{-1} at a current density of 0.5 Ag^{-1} by using 1 M KOH electrolyte compared to $NiWO_4$–EG (NW-E) the results are discussed.

PP-32

Relations of G-rook Brauer algebra

P. Sundaresan[1] and A. Joseph kennedy[2]

[1]*Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be university), Anand Nagar, Krishnankoil- 626126.*

[2]*Department of Mathematics, Pondicherry University, Puducherry - 605014, Puducherry, India.*

Email: sundaresan@klu.ac.in, kennedy.pondi@gmail.com

In this article, we focus on describing the G-Colored Rook Brauer algebra GR_n^k(x), which contains signed Brauer algebra, Rook brauer algebra and Brauer algebras. The structure and representations of algebras are studied and their generators and relations are also discussed.

PP-33

Copper doped tungsten oxide nanostructure: synthesis, characterization and photocatalytic activity

K. Tamilselvan, M. Arunpandian, S. Muralidharan and E.R. Nagarajan*

Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil - 626126, Tamilnadu, INDIA.

Email: nagarajanklu@gmail.com

The Cu-WO_3 and $CuWO_4$ nanoparticles in the current work were created using a hydrothermal technique. Many cutting-edge techniques were used to characterize the produced Cu-WO_3 and $CuWO_4$ nanoparticles. The synthesis of orthorhombic phase Cu-WO_3 and anorthic phase $CuWO_4$ nanoparticles is

confirmed by the X-ray diffraction pattern. The scanning electron microscopic image of the Cu-WO_3 and $CuWO_4$ samples reveals their nanoporous shape. Under UV light irradiation, the produced Cu-WO_3 and $CuWO_4$ nanoparticles successfully broke down the methylene blue. Using Cu-WO_3 nanomaterial as a photocatalyst, dye solution with an alkaline pH was treated to increase the decomposition efficiency.

PP-34

Structural and morphological investigation of capping agent concentration on synthesized Bi_2S_3 nanoparticles using Bismuth diethyldithiocarbamate complex

C. Sambathkumar[1], K. R. Nagavenkatesh[1] and P. Devendran[1,*]

[1] *Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil-626 126, Tamil Nadu, INDIA.*

**Corresponding Author Email: pdevavenmani@gmail.com, p.devendran@klu.ac.in*

Bismuth Sulfide (Bi_2S_3) is one of the most complex and challenging particles, and it was used in different applications because of its cost-effective material. In our study, we report a simple solvothermal method at low reaction conditions for synthesizing Bi_2S_3 nanoparticles with numerous morphologies using Bismuth (III) diethyldithiocarbamate ($Bi[DTC]_2$) complex and different concentrations (0.5, 1, 2, 3 and 4g) Hexadecylamine (HDA). The impact of different concentrations of HDA-capped Bi_2S_3 nanoparticles has been explored by physicochemical properties (ie, X-ray diffraction, Fourier infrared spectroscopy, Scanning electron microscopy and EDS with mapping analysis). It was observed that as the capping agent concentration increased, the morphology of the nanoparticles changed. The prepared 1g HDA-capped Bi_2S_3 nanoparticles have exhibited a rod-like morphology of Bi_2S_3 nanoparticles.

PP-35

Numerical calculation of MHD and chemical reaction on Jeffrey-Williamson nanofluid with adaptive thermal conductivity through porous medium

B. Reddappa and R. Geetha

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be university), Anand Nagar, Krishnankoil- 626126.

Email: b.reddappa@klu.ac.in

In this work, a numerical model is developed to study the effects of Brownian motion, thermophoresis, chemical reaction, heat generation, magnetohydrodynamic and thermal radiation has been included in the model of Jeffrey and Williamson nanofluid flow and heat transfer over a moving surface with variable thickness. The governing partial differential equations are reduced to nonlinear coupled ordinary differential equations by applying the suitable similarity transformations. These nonlinear coupled ordinary differential equations, subject to the appropriate boundary conditions, are then solved by using by BVP4c method. The roles of non-dimensional constraints on velocity, temperature and concentration of the fluid have been depicted in graphs. Numerical evaluations of the skin friction coefficient factor, Nusselt number and Sherwood numbers for various governed parameters on the Jeffrey and Williamson nanofluid properties are analyzed and shown in tabular form. To validate the results, a comparative study between the present study and previously published results for a particular case is conducted and good agreement is found between them.

PP-36

Synthesis, characterization biological activities and drug-like efficiency of novel mixed ligand complexes

S. Syed Ali Fathima[1]*, M. Mohamed Sahul Meeran[2]

[1]*Department of chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishsnankoil-626126.*

[2]*SGS gulf Limited, Al-Jafsa, United Arab Emirates*

Email. syed.s.@klu.ac.in

The novel bio-crucial mixed ligand compounds were synthesized from 10-Chloro-9-anthraldehyde, 4-Aminoantipyrine and 1,10-Phenanthroline and characterized by spectral and electro analytical techniques. From all the measurements, square planar geometry was proposed for all the synthesized compounds. The experimental results show that, the Schiff base and co-ligand were coordinated to the central metal ion through N,O and N,N modes respectively. Moreover, the synthesized compounds have driven for their biological outlook. The DNA synergy was achieved by UV-studies displayed that the prepared complexes may interact with nucleic acid through intercalated pathway. In addition, the complexes showed their efficient antimicrobial activities against bacteria (*Escherichia coli* & *Bacillus Subtilis*) and fungi (*Aspergillus niger*). The gel electrolysis study showed that the major DNA divergence activity of the complexes to cleave the pUC 18 nucleic acid fragment effectively. The free radical scavenging reports evident that the metal complexes carry the attractive talent to cleave the radical compared to ligand. The drug-like evaluations exposed that the mixed ligand complexes possess substantial drug-like efficiency based on Lipinski's laws. Eventually, the docking simulations are validated to realize the binding mode of the metal complexes with *FGF19* protein and 1BNA.

PP-37

Investigations on the electrochemical performance of CuO/MnO_2 @ MWCNT nanocomposite for supercapacitor application

G. Hariharan[a] , s. Arunpandiyan[a] and a. Arivarasan [a*]

[a] *Multifunctional Materials Laboratory, Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

**Corresponding Author: arivarasan.nanotech@gmail.com*

CuO/MnO_2@MWCNT (CMC) nanocomposites-based supercapacitor was fabricated and their electrochemical performance was studied. One step hydrothermal method was adopted to synthesize CMC nanocomposite and the prepared samples were calcinated at 300 ºC. The calcinated samples were characterized by powder X-ray Diffraction, Scanning Electron Microscopy, Fourier Transform Infrared Spectroscopy, techniques, to reveal, structural, morphological, molecular interactions, respectively. CMC nanocomposite based working electrodes were fabricated using doctor blade technique and their electrochemical performance was studied by an electrochemical workstation under three electrode configurations. Asymmetric supercapacitor was fabricated using CMC nanocomposite coated Ni foam as the working electrode and Activated carbon coated Ni foam as the counter electrodes. Electrochemical performances of the fabricated device was tested under 3 M KOH+ 0.2 M $K_4[Fe(CN)_6]$ aqueous electrolyte and it possessed the superior specific capacitance of 818.72 Fg^{-1} with the Energy and power densities of 700 W kg^{-1}, 15.8 Wh kg^{-1}, respectively.

PP-38

Majority power dominating sets of some classes in graphs

T. Muthukani Vairavel

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil- 626126.

A majority power dominating set (MPDS) is a subset of vertices in a graph such that every vertex either belongs to the set or is adjacent to at least half of the vertices in the set. The concept of MPDS has been extensively studied in graph theory due to its applications in wireless communication, social networks, and distributed computing. In this abstract, we focus on some classes of graphs where the MPDS problem has been widely investigated. Firstly, we consider bipartite graphs, where it has been shown that finding the minimum MPDS is NP-hard. However, for some other classes of graphs, such as split graphs, Path, Cycle etc. studied, Secondly, we look at graphs, which have a special structure that allows for a linear-time algorithm to find the minimum MPDS.

PP-39

Synthesis of novel nanocrystalline sr and fe doped $ndcoo_3$ based perovskite oxide as an efficient cathode material for it-sofc applications

S. Dharani Priya[1], A. Samson Nesaraj[1,2*]

[1]*Department of Applied Chemistry, Karunya Institute of Technology and Sciences (Deemed to be University), Karunya Nagar, Coimbatore – 641 114, Tamil Nadu, India.*

[2]*Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Anand Nagar, Krishnankoil – 626 126, Tamil Nadu, India.*

**Email address: samson@klu.ac.in*

Chemical synthesis and characterization of seven different compositions of $Nd_{1-x}Sr_xCo_{1-y}Fe_yO_{3-\delta}$ (NSCFO I-VII) (where x= 0.05, 0.10 and y= 0.05, 0.10, 0.15 and 0.20) perovskite cathode materials were focused in this work for LTSOFC application. The thermal behavior was examined using TGA, and the findings indicate that stable weight loss starts to happen at 800°C. The structural effects of the created composite compositions were examined using X-ray diffraction. Peaks associated to $NdCoO_3$ were seen, and they were compared to information from the typical JCPDS. The lattice constants for the NSCFO compositions were ranged from 7.536 to 7.579. Crystallite sizes for the compositions ranged between 14.81 and 21.80 nm. The M-O bonds were confirmed by infrared spectroscopy. The composition NSCFO IV was found to have the highest conductivity of 1.362 Scm^{-1} at 600°C and the lowest activation energy of 0.2928eV in an atmosphere of air using AC impedance spectroscopy. The effects of Sr and Fe doping in $NdCoO_3$ compositions were also examined in order to find

a potential candidate cathode material for solid oxide fuel cells operating in the low temperature range.

PP-40

Study on reflux synthesized $CoFe_2O_4$ nanoparticles electrochemical performance

G. Vignesh[1] and M. Krishna Kumar[2]*

[1] *Department of Physics, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil-626 126, Tamil Nadu, INDIA.*

[2] *Department of Physics and Electronics, CHRIST (Deemed to be University), Bengaluru-560 029, Karnataka, INDIA.*

Email: krishnakumarinfo@gmail.com

$CoFe_2O_4$ nanoparticles have attracted interest for electrochemical applications because of their straightforward oxidation and reduction capabilities. X-ray diffraction analysis was applied to determine the internal structure of $CoFe_2O_4$ after it had been synthesized using the reflux method. Using SEM analysis, it was possible to determine the spherical morphology of $CoFe_2O_4$ nanoparticles. Co, Fe, and O elements were detected by mapping analysis and the elemental analysis, which proved their presence. The produced $CoFe_2O_4$ nanoparticles were subjected to electrochemical experiments, and it was discovered that they had a specific capacitance of 101.6 Fg^{-1} in $1Ag^{-1}$ and 146.6 Fg^{-1} for $5mVs^{-1}$ in cyclic voltammetry measurement. A good cycle stability performance up to 5000 cycles has been determined as good and also the energy density and power density, which are respectively 1.6 W h Kg^{-1} and 1500 W Kg^{-1} for the $CoFe_2O_4$ nanoparticles.

PP-41

Queuing system of feedback services

S. Maragathasundari

Department of Mathematics, Kalasalingam Academy of Research and Education, Anand Nagar,Krishnankoil-626126.

This article discusses a non-Markovian single-server queuing model with Poisson arrivals in varying-sized stacks. A general service with a random duration of three service phases is offered to clients by the server at one time. During the initial stage of service, there may be a random interruption to the server. The server immediately starts the repair process, and after the repairs are finished, service is restored. Customers who have already obtained the first phase of service are then given the second phase of service. A feedback service is provided at this point are given for the customers who were unsatisfied with the first and second stages of service. This feedback service is optional. At the conclusion, the last stage of service is offered. If there are no active clients in the system once service is finished, the server goes on vacation. The extra variable technique of queuing theory determines the duration of the queue length in various system states in terms of probability generating functions and all queue performance measures for the defined queuingsystem. By using a sensible application and being accompanied by a mathematical depiction, the problem of described lines is very effectively clarified.

PP-42

Optical studies on copper sulphate pentahydrate doped iota-carrageenan polymer electrolytes

P.Saranya[a], D. Vanitha[b], K.Sundaramahalingam[c] and M. Nandhinilakshmi[a]

[a]*Multi-Functional Materials Laboratory, International Research Centre, Kalasalingam Academy of Research and Education 626 126, Tamilnadu, INDIA.*

[b]*Department Of Physics, Kalasalingam Academy of Research and Education 626 126, Tamilnadu, INDIA.*

[c]*Department Of Physics, Arulmigu Kalasalingam College of Arts and Science, 626 126, Tamilnadu, INDIA.*

Iota-Carrageenan is water-soluble polysaccharide extracted from red algae and consist of long straight chains of D-galactose and D-anhydrogalactose with anionic sulfate group. The Solution Casting process was used to make a biodegradable polymer film derived from Iota-Carrageenan and Copper Sulphate Pentahydrate ($CuSO_4.5H_2O$). To investigate the optical property, different wt.% of $CuSO_4.5H_2O$ were added to I-carrageenan . The amorphous nature of the film was confirmed using an X-Ray Diffraction (XRD) pattern. The functional group and interaction between the different components present in the polymer film were resulted by Fourier Transform Infrared (FTIR) analysis, implying that the addition of ($CuSO_4.5H_2O$) salt causes microstructural differences in the polymer film. The UV-Visible Spectrometer was used to record the optical properties like the absorption coefficient, extinction coefficient, and optical bandgap energy of the polymer blend electrolytes. From this, it is observed that the absorption value increases with the addition of salt. The optical band gap was also recorded and it is observed that 20wt.% of $CuSO_4.5H_2O$ added polymer electrolyte was found to have higher energy gap (4.3eV) compared with the other.

PP-43

Vehicle dispatching plan for minimizing passenger waiting time in a corridor with buses of different sizes: Model formulation and solution approaches

M. Matheswaran, K. Karuppasamy, S. Bathrinath

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be university), Anand Nagar, Krishnankoil- 626126.

Email: matheswaran@klu.ac.in

Urban public transportation agencies sometimes have to operate mixing vehicles of different sizes on their routes, due to resource limitations or historical reasons. Services with different passenger-carrying capacities are provided to passengers during a mixed-fleet operation. A fundamental question arising here is how to optimally deploy a given fleet of different bus sizes to provide services that minimize passenger waiting time. We formulate a mixed-fleet vehicle dispatching problem as a Mixed-Integer Nonlinear Programming (MINLP) model to optimize dispatching schemes (dispatching orders and times) when a given set of buses of different sizes are available to serve demand along a route. A Simulated Annealing (SA) algorithm coupled with a Monte Carlo simulation framework is developed to solve large real-world instances in the presence of stochastic travel times. Results show that, in addition to dispatching headway, bus dispatching sequence can strongly affect waiting times under a mixed-fleet operation. Indeed, with an optimal dispatching sequence, a more accurate adjustment of supply to demand is possible in accordance with time-dependent demand conditions, and the total savings in waiting time are mainly driven by a further reduction in the number of passengers left behind. The optimality of uneven dispatching

headways stems from two elements: having a mixed fleet and having localized peaks on demand that make buses run full.

PP-44

Palladium decorated carbon nitride: a pragmatic catalyst for the construction of carbon-carbon double bonds in water

V. Saravanan, P. Lakshmanan, C. Ramalingan*

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed To Be University), Krishnankoil, 626126, Tamil Nadu, India

saravananvj11@gmail.com

Graphitic carbon nitride immobilized by palladium was synthesized through co-precipitation method and characterized unequivocally by means of X-ray diffraction (XRD), infrared spectroscopy (IR), scanning electron microscopy (SEM) along with energy dispersive X-ray (EDX), X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM). Application of the same as an efficient catalyst for the construction of significant pharmacophores / intermediates of biopertinent chemical entities, bis(hetero/homoarylidene)-1-alkylpiperidin-4-ones, bis(hetero/homoarylidene)cycloalkanones and 2-(homo/heteroarylidene)malononitriles through carbon-carbon double bond formation offered admirable outcomes. The reaction progressed well in water, an environmentally benign solvent besides at ambient temperature. The efficiency of the catalytic progression revealed impressive performance towards recyclability.

PP-45

Optimization of ionic conduction and structural properties of biopolymer electrolytes system for electrochemical applications

R. Jansi[1,2] and M.S. Revathy[1*]

[1]*Department of Physics, School of Advanced sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Virudhunagar, Tamil Nadu, INDIA.*

[3]*Multifunctional materials laboratory, International research centre, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Virudhunagar, Tamil Nadu, INDIA.*

Corresponding Author: revz27vijay@gmail.com*

The investigation on bio-based polymer electrolytes (BBPEs) system based on Sodium alginate (NaAlg) blend Pectin with a various composition were prepared using solution casting technique. The BBPEs complexes were characterized by using X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy and electrical impedance spectroscopy (EIS). The complexation was observed to have taken place between NaAlg blend Pectin. Moreover, from the impedance analysis, it is evident that the sample which contains 60 wt.% NaAlg blend 40 wt.% pectin possessed the optimum ionic conductivity of 1.263×10^{-7} S cm^{-1} at room temperature with the lowest activation energy. The findings of the present investigation suggest that NaAlg blend Pectin polymer matrix has the potential to be applied as a biodegradable electrolyte system for electrochemical devices applications.

PP-46

Analyzing boundary dominating sets using mathematical modelling

M. Sivanandha Saraswathy

Department of Mathematics, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil-626126.

E mail: sivanandha@klu.ac.in

Let G be a nontrivial connected graph. The distance between two vertices u and v of G is the length of a shortest u-v path in G. Let u be a vertex in G. A vertex v is an eccentric vertex of u if $d(u;v) = e(u)$, that is every vertex at greatest distance from u is an eccentric vertex of u. A vertex v is an eccentric vertex of G if v is an eccentric vertex of some vertex of G. Consequently, if v is an eccentric vertex of u and w is a neighbor of v, then $d(u;w) \cdot d(u; v)$. A vertex v may have this property, however, without being an eccentric vertex of u. A vertex v is a boundary vertex of a vertex u if $d(u;w) \leq d(u; v)$ forall $w€N(v)$. A vertex u may have more than one boundary vertex at different distance levels. A vertex v is called a boundary neighbor of u if v is a nearest boundary of u. The number of boundary neighbors of a vertex u is called the boundary degree of u.In this paper we discussed about the integer linear programming model of boundary dominating set problem. We also analyzed the relationship between different boundary related graph theoretical parameters.

PP-47

Half-metallic p^0-d half-Heusler alloys MgXSb (X= Fe, Ni) for Spintronic Applications

P. Selvarengan*, A. Karthikeyan, P. Ramkumar and S. Vinsat

Department of Physics, School of Advances Sciences, Kalasalingam Academy of Research and Education, Krishnankoil 626 126, INDIA.

** E- Mail Id: p.selvarengan@klu.ac.in*

We investigate the structural, Electronic, magnetic, and mechanical stability of p^0-d half-Heusler compounds (MgXSb X= Fe, Ni) composed of p^0 = Mg alkaline earth metals; 3d transition metals; and Sp atoms. All calculations are performed using the density functional theory (DFT) as implemented in the quantum espresso code. The PerdewBurke-Ernzerhof (PBE) type of the generalized gradient approximation (GGA) to the exchange correlation functional is used. The choice of pseudo potential used is the ultra-soft pseudo potential (USPP). All calculations were done using 50 and 500 for ecutwfc and ecutrho, respectively. The system was treated as a ferromagnetic system in FCC crystallized phase. A Monkhorst–Pack 8 × 8×8 k-point mesh was used for the SCF calculation. Both alloys are observed to have ferromagnetic character and are also half-metallic with a small band gap in their spin up channel. The magnetic moment of both alloys are also found to obey the Slater-Pauling rule with a magnetic moment of 1μB each. Hence these alloys can be used for Spintronic applications.

PP-48

Arrival time prediction using fuzzy graphs with alpha cuts in graph Markov process

S. Sarulatha

Department of Mathematics, School of Advanced Science,
Kalasalingam Academy of Research and Education,
Krishnankoil-626126.
Email: sarulatha@klu.ac.in

In a stochastic model providing a sequence of possible events in which the probability of each event depends only on the state attained in the previous event using in Markov process. We can say that by the thought of as, "What happens next depends only on the state of affairs now"; this is applicable only for certain situations. In case the uncertainty arises we need fuzzification to solve the situation. I fuzzify the graph Markov process using fuzzy graphs with alpha cuts to determine the arriving time of bus, train and food delivery from one place to another. The constraints are treated as alpha cuts, the places are treated as nodes and the routes are treated as arcs. That nodes and edges are described by the membership function and it is created as fuzzy graph then I obtain clear prediction of arrival time of bus, train and food delivery at the right time.

PP-49

Cerium immobilized carbon nitride catalyzed construction of C=C in water: A proficient and green methodology

V. Saravanan, P. Lakshmanan, C. Ramalingan*

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed To Be University), Krishnankoil, 626126, Tamil Nadu, India

saravananvj11@gmail.com

Cerium immobilized graphitic carbon nitride (Ce-GCN) was prepared to construct carbon-carbon double bonds from heteroaromatic / homoaromatic / aliphatic carbonyl compounds and malononitrile. The co-precipitation method was employed to prepare the catalyst and various spectroscopic/microscopic techniques such as infrared spectroscopy (IR), scanning electron microscopy (SEM) with energy dispersive X-ray (EDX) analysis, X-ray diffraction (XRD), inductively coupled plasma optical emission spectrometry (ICP-OES), X-ray photoelectron spectroscopy (XPS) and transmission electron microscopy (TEM) were used to characterize the synthesized catalyst. Upon utilization of the catalyst thus prepared, the reaction proceeded well in water, a green solvent at ambient temperature. The catalytic efficiency revealed good performance towards reusability.

PP-50

Studies on near infrared emitting Cr^{3+}:$Cs_2NaBiCl_6$ double perovskites

M. Jeevaraj[1] and M. Krishna Kumar*[2]

[1]*Department of Physics, Kalasalingam Academy of Research and Education (Deemed to Be University), Krishnankoil – 626126, Tamil Nadu, INDIA.*

[2]*Department of Physics and Electronics, CHRIST (Deemed to be University), Bengaluru-560 029, Karnataka, INDIA.*

Email: krishnakumarinfo@gmail.com

Near infrared (NIR) spectroscopy has received significant interest recently due to its wide applications in food quality testing, medical/bio imaging, night vision camera and plant growth, etc., Especially in the field of bioimaging, NIR region exhibits reduced scattering, high penetration depth, good resolution and improved signal to noise ratio as compared to other electromagnetic probes. However, conventional NIR sources such as tungsten halogen lamps are limited by their small life span, poor efficiency and large size. Instead, phosphor converted light emitting diodes are energy efficient, compact and have a long life. In this work, Cr^{3+} :$Cs_2NaBiCl_6$ has been synthesized using simple chemical reflux method and its crystalline phase is identified using XRD. Raman bands at 94 and 259 cm^{-1} are signatures of Cr^{3+} : $Cs_2NaBiCl_6$ double perovskites. SEM images revealed octahedral shaped particles. Cr^{3+}: $Cs_2NaBiCl_6$ shows a strong and broad NIR emission from 800 – 1400 nm with a peak at 922 nm.

PP-51

Secret recovering with insufficient shares in threshold secret sharing scheme

L. Sreenivasulu Reddy

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626216.

E-Mail: l.sreenivasulu@klu.ac.in

The recovering secret of perfect threshold secret sharing scheme with insufficient number of secret shares is very complex task and sometimes it is impossible even the adversary is one of the authenticated participants. This paper mainly focuses on recovering secret by the inside adversary using a system of algebraic linear equation solving procedures and elementary combinatory principles. These attacks are divided into two types based on the first component of the secret share $(x, f(x))$ of the authenticated participants are secret or public. Later, each type is divided into four types based on the number of secret shares available to the adversary. Ultimate goal of this work is no secret sharing scheme is perfect.

PP-52

Sodium alginate/Hydroxyapatite/nanocellulose composites for bone tissue engineering

S. Iswarya[1,2], T. Theivasanthi[1,2*] and K. Chinnaiah[1,2]

[1] *International Research Centre, Kalasalingam Academy of Research and Education (Deemed University), Krishnankoil 626126, Tamil Nadu, INDIA.*

[2] *Department Of Physics, Kalasalingam Academy of Research and Education (Deemed University), Krishnankoil 626126, Tamil Nadu, INDIA.*

[*]*E- mail: t.theivasanthi@klu.ac.in*

Bone tissue engineering is considered as a biomimetic approach to generate the bone using biomaterials. Sodium alginate/hydroxyapatite/Nano cellulose (SA/HA/NC) bio nanocomposite films that possess a good biocompatibility for bone tissue engineering are prepared by a simple solution casting process. Hydroxyapatite is one of the most frequently used bio ceramic material to achieve high biocompatibility. The bio nanocomposite films are analysed by XRD, SEM, EDAX and FTIR analyses. XRD confirms the existence of fillers in the polymer. FTIR spectrum shows the various functional groups in the bio nanocomposite films. Morphology of the fillers and bio nanocomposite films are obtained through SEM. The inclusion of NC with different concentrations into the biopolymer film improves the tensile strength. As a result, the loading of 5 w t% of NC and 10 w t% of HA in the SA polymer shows the high tensile strength when compared to the pure SA. The tensile strength of the bio nanocomposite film with 10% of hydroxyapatite is increased by 17%. The tensile strength of the bio nanocomposite film with 0.5 w t% and 2.5 w t% of NC is increased by 177% and 277% whereas the tensile strength of the bio nanocomposite film loaded 5 w t% of NC is increased by 331%. The main conclusion arising from the analysis of the result is that the bio nanocomposites containing 5 w t% of nanocellulose

exhibited the highest enhancement in tensile strength which can be used for the treatment of bone damage and bone regeneration.

PP-53

Blast domination number o'er mycielskian number

A. Ahila

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education [Deemed to be University], Anand Nagar, Krishnankoil – 626126, Virudhunagar District, Tamilnadu, India.

Email: dr.aaasundar@gmail.com

Across this artefact, we bash the comparability of the domination parameter, the blast domination number with the mycielskian number. correspondingly, we derive the blast domination number for selected special mycielskians, viz., peterson graph, quasi-total graphs, friendship graph, comb graph, book graph, total graph of path, total graph of cycle, total graph of wheel. consequently, the applications of both parameters are esteemed multiple, by the hunt

PP-54

Simultaneous detection of corticosteroids, small peptides, SARMs and quaternary ammonium drugs in camel urine

N. Jahfar[a,b*], P.T. Rasik[a], O.K. Praseen[a], P. Shamil[a],
N. Selvapalam[b] and E.R. Nagarajan[b*]

[a]*Camel Forensic Laboratory, Central Veterinary Research Laboratory, Dubai, U.A.E*

[b]*Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil - 626126, Tamilnadu, India.*

Email: nagarajanklu@gmail.com

A simple robust and sensitive high resolution method for the simultaneous detection of small peptides, corticosteroids, selective androgen receptor modulators (SARMs), and quaternary ammonium drugs (QADs) was developed using liquid chromatography accurate mass spectrometer.The method utilises a mixture of internal standards for each class of drugs and a single stage extraction approach for multiple drugs, saving laboratory resources and reducing analysis time for antidoping laboratories. In this study, a comprehensive mixed mode solid phase extraction procedure with a sequential elution was developed and validated for 33 corticosteroids, 21 small peptides, 15 SARMs and prominent QADs, the drugs were separated on a reverse phase C18 column and analysed by high resolution mass-spectrometry (HRMS), validation was performed on selected drugs based on the availability of standard reference material and the frequency of abuse in animal sport. However the proposed extraction and analysis method can easily be extended to include new drug candidates without the need for method redevelopment; the full-scan MS data generated by orbitrap HRMS also allows retrospective analysis of emerging drugs that were unknown at the time of analysis.

PP-55

Catalytic studies of Heusler's Alloys for environmental application

Ajmal Ibn Mohammed Althaf and P. Selvarengan*

Department of Physics, School of Advanced Sciences,
Kalasalingam Academy of Research and Education (Deemed To Be University)
Krishnankoil 626126, INDIA.
**Corresponding Author: p.selvarengan@klu.ac.in*

Toxic gases like Carbon Monoxide, Nitrous oxide cause various problems in our ecosystem. This research focuses on the oxidation of these gases using Heusler alloys and reducing the ill effects in the environment. A Heusler alloy is an intermetallic alloy described as X_2YZ. The electronic structure of Heusler alloys can be modified through elemental substitution which allows for fine-tuning of the functional features. Heusler alloys are investigated using density functional theory (DFT) calculations. The catalytic reaction is studied using the DFT tools and the activity of alloys is evaluated.

PP-56

Weighted average LINMAP decision making method based on aggregation operators in neutrosophic environment

G. Tamilarasi

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, India.

Considering the situation where decision values are single valued trapezoidal neutrosophic (SVTN) numbers is an sufficient way for uncertainty and imprecise situation in decision making problems. Al- though numerous methods have been developed for enterprise selection problem. In this paper, the article introduces a new approach for handling multi attribute decision making (MADM) problem under SVTN numbers. Therefore, we integrated the single valued trapezoidal neutrosophic aggregation operators and linear programming technique for the multidimensional analysis of preferences (LINMAP) to sup- port hamming distance formula was used to get the ranking order best alternative for enterprise selection problem.

PP-57

ZnO-CuO-NiO nanocomposite based photocatalyst for the efficient treatment of polluted water

S. Kokila , A. Samson Nesaraj*

Department of Chemistry, School of Advanced Sciences,
Kalasalingam Academy of Research and Education, Anand Nagar,
Krishnankoil-626 126, Tamil Nadu, India.
**Email address: samson@klu.ac.in*

Many industrial units related to textile, pharmaceutical, mine, oil refineries and sugar mills produce huge pollutants having toxic chemicals every-day which pollute the environment greatly. Among which, the treatment of dye contaminated wastewater has lot of challenges. Several strategies are utilized to remediate dye-contaminated wastewater because its disposal is a major issue worldwide. One of the treatment cost effective wastewater treatment processes is the photo-catalysis. In this research work, we report a simple and cheap method of preparation of multicomponent metal oxide nanocomposite based photocatalyst by chemical precipitation. The prepared ZnO-CuO-NiO nanocomposite was characterized by TGA, XRD, FT-IR, EDX, SEM, UV and PL techniques. Then, the nanocomposite material was effectively employed as a photocatalyst to degrade the Rhodamine B dye present in the water sample under UV light irradiation. The obtained results were presented and discussed in this research article.

PP-58

Essential Things to be learned to approximate the energy value of a Helium atom for Beginners

R. Bapitha and P. Selvarengan*

**Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed To Be University)*
Krishnankoil 626126, INDIA.
**Corresponding Author: p.selvarengan@klu.ac.in*

Here we discuss some important Quantum Mechanical terms like wave function, Probability density and so on. Also, we detail Bohr atom model and Pauli's Principle, the former one is the theoretical explanation of the Hydrogen spectrum based on quantum ideas and the later concept is used in Slater determinant which care about spin of electrons. Then, we elucidate the energy calculation methods of many electrons atom such as Time independent Perturbation Method, Variational Method, Hartree Fock Method and Kohn-Sham equation which are applied for the approximation of energy value of Helium atom.

PP-59

Computational of Structural Parameters of a Collaboration Graph from Social Networks – SN, Part III

M. Anitha*, V. Yegnanarayanan

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be university), Anand Nagar, Krishnankoil- 626126, Virudhunagar Dist., Tamil Nadu, India.

**Corresponding author email: m.anitha@klu.ac.in*

The purpose of this article is to compute the various structural parameters of Rolf Nevanlinna Prize winners collaboration graph for the period 1982-2014 arising from a social network. In order to generate the collaboration graph the methodology adopted depend on the Erdos number of the prize winners and their coauthors linked to Paul Erdos. An exhaustive chain of intermediate mathematicians between these prize winners to Erdos are accessed from AMS-MR data repository. The collaboration graph is generated by using the Pajak program. Some interesting results concerning the exact determination of structural parameters such as domination numbers and their variants are also obtained.

PP-60

Synthesis of graphitic carbon nitride based materials and their application for degradation of pesticides

P. Sadiqbasha[a] and C. Ramalingan[a]

[a]*Department of Chemistry, Organic Synthesis Laboratory, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankovil.*

Email: sadiqbasha.p@klu.ac.in

The synthetic industry has destroyed the life span of human beings due to environmental pollution. The dis-charged organic pollutants and pesticides can be degraded by many physicochemical techniques, among them the heterogeneous photocatalysis is distinctive. Inspired by these items, metals doped graphite carbon nitride was prepared by a facile hydrothermal method. The facile fabrication was achieved through the hydrothermal approach. The characterization techniques such as X-ray diffraction, Fourier transform infrared and Scanning electron microscopy equipped with energy dispersive X-ray was used. The analysis confirmed the successful fabrication of the photocatalysts. The energy bandgaps of the prepared photocatalysts were measured by the Tauc plot method using a UV–visible spectrophotometer. The energy bandgap values suggest that the insertion of graphite carbon nitride improves the optical response of catalysts under sunlight. A mechanism was proposed to explain the enhancement of photocatalytic performance.

PP-61

Molecular design and docking analysis of some ligands for Alzheimer's disease

A.Karthikeyan[1] and P. Selvarengan[1,*]

Department of Physics, School of Advances Sciences, Kalasalingam Academy of Research and Education, Krishnankoil 626126, INDIA.

** E- Mail Id: p.selvarengan@klu.ac.in*

Alzheimer's disease (AD) is a devastating mental illness with an irreversible progressive brain disorder that slowly destroys memory skills and learning abilities. The disease starts with mild symptoms and gradually becomes severe. AD is one of the leading causes of mortality worldwide. Recently, the FDA approved ubrogepant, olcegepant and rimegepant as oral drugs to treat migraines. Here we present three ligands, with ubrogepant, rimegepant, and olcegepant, were docked with each of the receptors (1EVE, 4EY7, 4PQE). Our studies indicate that the olcegepant binds most strongly to 1EVE compared to others. The ubrogepant and rimegepant both contact 4EY7 and 4PQE of the receptor, while olcegepant does not. These crystal structures provide a more accurate platform for further drug development than previously available. The results of this study elucidate the interactions in the binding pocket of 1EVE receptor and can assist in further development. All the work has been done in Pyrx and Autodock vina softwares.

PP-62

On Diophantine equation $8^x + 36^y = 44^z$

P. Vimala Devi

Department of Mathematics, Kalasalingam academy of research and education, Anandnagar, Krishnankoil-626126

In this paper, we show that the Diophantine equation $8^x + 36^y = 44^z$ has a unique non- negative integer solution. The solution is (x, y, z) is $(1,1,1)$.

PP-63

In-silico docking studies of proteins with cancer, diabetes, and covid-19 drug molecules

R. Pavitra, K. Pandia Rajan, K. Karpagalakshmi, P. Lakshminarayanan, E. R. Nagarajan, N. Selvapalam

Center for Supramolecular Chemistry, International Research Center Department of Chemistry, Kalasalingam Academy of Research and Education (Kalasalingam University), Krishnankoil, Tamil Nadu State, INDIA 626 126

**e-mail: n.selvapalam@klu.ac.in*

In Silico modelling is a modern way of drug discovery with the utilization of computer simulation and that will give useful information of how the drug molecules interact with proteins that have been expressed by humans. Drug discovery is a challenging task as the screening of the molecules from the various synthetic and non-synthetic pathways undergoes various phases of drug development until it reaches human testing which takes several years. To minimize this lengthy process, several software had been developed by scientists to tackle this problem. Docking studies are made easy from the Autodock Vina and other software to predict the binding affinities of the small

molecules on the Tumor proteins. Furthermore, we can get information of the docking positions of the small molecules in the protein pockets. There are various approaches to performing docking studies to get the best results and get favourable small molecules and such molecules could be synthesized and could be tested for cancer or other relevant diseases. In the present studies, we have utilized the cancer protein, especially p53-related proteins as it is known as a tumor marker in several of the research studies. On the other hand, we have utilized several of the known cancer drugs to understand the best binding pockets of protein through host-guest interactions. Similarly, we have scanned for other proteins such as diabetics and covid-19 to find out the best alternative medicine to solve the recent pandemic situation. Additionally, we get the information of binding constants of the small molecules to understand the interaction potential of the small molecules towards the p53-related proteins, diabetic proteins, and covid-19 proteins. Among the several drugs, we have utilized Taxol molecule which is a well-established drug that could be a suitable alternative drug to be tested for covid 19 as it showed good binding affinity. We have attempted several of the derivatives of anti-cancer drugs, anti-viral drugs, and diabetic drugs and examined their binding affinities. The results obtained are very interesting and found to have many interesting features, especially the binding sites of these small molecules. In conclusion, we have done docking studies of the proteins with some of the interesting existing drug molecules, which would be helpful for the future designing of new drug molecules for cancer, diabetics, and covid-19.

PP-64

A new biopolymer blend electrolyte: synthesis and characterization of iota-carrageenan with acacia gum

M. Nandhinilakshmi[a], P. Saranya[a], D. Vanitha[b*], N. Nallamuthu[b] and K. Sundaramahalingam[c]

[a]*Multi-Functional Materials Laboratory, International Research Center, Kalasalingam Academy of Research and Education, 626 126, Tamilnadu, INDIA.*

[b]*Dayananda Sagar of Academy of Technology and Management, Uthayapura, Bangalore - 560082, INDIA.*

[c]*Department of Physics, Arulmigu Kalasalingam College of Arts And Science, 626 126, Tamilnadu, INDIA.*

Corresponding Author Email Id: vanibala2003@gmail.com

In the last decade, the development of high-efficiency electrolytes based on bio-polymeric materials has drawn increasing attention. Carrageenan is a family of linear sulfated polysaccharides extracted from red edible seaweeds. The host polymer was chosen as Iota carrageenan, it has good film forming tendency, commercially available biopolymers and is readily soluble in hot water. To enhance ionic conductivity blend polymer techniques approach good result. For this reason Gum acacia (GA) is a natural gum with a high molecular weight; it is a polysaccharide material that is acidic in nature and the least viscous among hydrocolloids taken as blend polymer.Solution casting techniques were used to prepare various compositions of Iota carrageenan and Acacia gum blend polymer. The prepared blend electrolytes were characterized by XRD and FTIR and Impedance spectroscopy to know about the complexation, structural reorganization and conductivity respectively. The composition of 60 wt.% Iota carrageenan: 40 wt.% Acacia gum had the highest as 4.77 $\times 10^{-6}$ S/cm and minimum activation energy as 0.11eV. The temperature dependent conductivity confirms the Arrhenius behavior of the prepared electrolytes.

PP-65

Analytical expressions for the concentrations of substrate, oxygen and mediator in an amperometric enzyme electrode

K. Indira

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Anand Nagar, Krishnankoil- 626126, Virudhunagar Dist., Tamil Nadu, India.

Email: indira.k@klu.ac.in

The theoretical model in immobilized oxidase enzyme electrodes is discussed. This model contains a non-linear term related to enzyme reaction system. In this paper, we obtain approximate analytical solutions for the non-linear equations under steady-state condition by using the homotopy perturbation method (HPM) and homotopy analysis method (HAM). Simple and approximate polynomial expressions for the concentration of substrate, oxygen, reduced mediator and current were obtained in terms of Thiele moduli and the normalized surface concentrations of species. Furthermore, in this work the numerical simulation of the problem is also reported using Scilab/Matlab program. An agreement between analytical and numerical results is noted.

PP-66

Nickel oxide modified C_3N_5 photocatalyst for enhanced hydrogen evolution performance and degradation of organic dye

S. Muralidharan and E.R.Nagarajan*

Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil - 626126, Tamilnadu, INDIA.

Email: nagarajanklu@gmail.com

A novel carbon nitride (C_3N_5) photocatalyst has recently garnered a lot of attention to its superior light harvesting and distinctive 2D structure. However, the photocatalytic efficacy is significantly impacted by high electron-hole pair recombination rates of bulk C_3N_5. Here, a simple hydrothermal approach was used to create a nickel oxide (NiO) modified C_3N_5 p-n junction photocatalyst. Techniques such as XRD, FTIR, EDX, SEM, UV, TGA, and PL were used to characterize the NiO/C_3N_5. In this experiment, a NiO/C_3N_5 hybrid photocatalyst is used to demonstrate the photocatalytic degradation of the azo dye, methyl orange, which is triggered by under UV light irradiation. Using a straightforward calcinations technique, the NiO/C_3N_5 hybrid photocatalyst with varying weight percentage was successfully created. X-ray diffraction, Fourier-transform infrared, scanning electron microscopy-electron dispersive, high resolution transmission electron microscopy, UV-Vis diffuse reflectance, atomic absorption spectroscopy and photoluminescence spectroscopy were used to describe the produced materials. Findings demonstrated that under visible light, the NiO/C_3N_5 nanosheet photocatalyst had very high hydrogen generation efficiency.

PP-67

Studies on structural and electrical characterization of lithium ion conducting polymer electrolytes based on blend of PVDF-HFP and PVP

M. Murugesan[a], N. Nallamuthu[b,] * and P. Devendran[a,*]

[a]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil – 626126, INDIA.*

[b]*Dayananda Sagar of Academy of Technology and Management, Uthayapura, Bangalore- 560082, INDIA.*

** E- Mail Id: p.devendran@klu.ac.in; nnallamuthu001@gmail.com*

Batteries and capacitors can electrochemically store electrical energy. Batteries are fully developed as energy storage systems with higher energy density and high voltage. There remains intense interest in developing solid polymer electrolytes, free from low molecular weight alkaline metal and with a sufficiently high ionic conductivity for application in all-solid-state rechargeable lithium batteries and capacitors. The wide-ranging dissolving sat, lithium nitrate act as best lithium ion conducting compound because of it homogeneously mixed with poly vinlylidone fluoride – co – hex floro propylene (pvdf- HFP) and polyvinyl pyrrolidone. The different composition of lithium nitrate mixed blend polymer film (PVP/ PVDF-HFP/$LiNO_3$) is prepared by solution casting method. Structural characterization and the functional group identification are substantiated X ray diffraction methods. The microstructural studies using impedance properties of conductivity, impedance and dielectric behaviour. The temperature involved electrical conductivity studies are proved the Arrhenius behavior and the activation energies are found to be 0.32663 eV and 0.131765 eV. Fig. a) XRD diffraction pattern and b) Arrhenius plot of prepared polymer electrolyte.

PP-68

Estimation of parameters of Burr Type XII population based on progressive randomly censored data

Indrajeet Kumar

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Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, India

Email*:* *indrajeet.stats@gmail.com* , *indrajeetkumar@klu.ac.in*

Censoring commonly occurs in real-world scenarios, whether intentionally or accidentally. Unintentional (or accidental) censoring happens at random, i.e., it is out of the experimenters' control, such as broken equipment, lack of follow-up, etc. Intentional censoring is typically designed by experimenters to save time and money or reduce additional waste. In this paper, we developed statistical inferences for the parameters of Burr type XII distribution under the Koziol-Green model based on progressive randomly censored data. The associated model parameters are computed from both classical and Bayesian paradigms. In the case of the classical technique, the maximum likelihood estimates and asymptotic confidence intervals of the unknown parameters are computed. Additionally, two approximation techniques, the Tierney-Kadane (TK) approximation and Markov Chain Monte Carlo (MCMC) method are used to produce the Bayes estimates under a particular loss function, squared error loss function (SELF). An extensive numerical computation is performed to analyze the efficacy of the considered model and methodology developed in this study through a Monte Carlo simulation and real data application.

PP-69

Polymer-metal organic frame works [polymofs] as hybrid nanocomposite materials - An overview on its recent developments and future perspectives in drug delivery systems

V. Aruna[a], A. Gangadhara [b] and E.R. Nagarajan[a]*

[a]*Department of Chemistry, Kalasalingam Academy of Research and Education, Anand Nagar, Krishnankoil-626126, Tamilnadu, INDIA.*

[b]*Department of Humanities and Sciences, VNR Vignana Jyothi Institute of Engineering and Technology, Hyderabad-500090, Telangana, INDIA.*

Email: nagarajanklu@gmail.com

Polymer-metal organic frame works [PolyMofs] are an important category of hybrid nanocomposite materials that demonstrate distinct physicochemical properties that are inaccessible with individual components acting alone. These hybrid nanocomposites have recently attracted intensive research interest owing to their promising potential for a broad assortment of biomedical applications. The main challenging characteristic of PolyMofs is the complex interfacial regions between the metal organic frame work and polymer matrices. MOFs are a class of porous materials composed of metal nodes and organic linkers. Their modular nature allows for great synthetic tunability, affording both fine chemical and structural control. Despite their tremendous applications in drug delivery systems, MOFs possess several issues such as poor degradability, poor colloidal stability in aqueous solution which might lead to accumulation-induced biocompatibility risk. To address these limitations, several advancements have been made to fabricate polymeric nanocomposites of MOFs for their utility in various drug delivery systems. In addition current challenges and future perspectives of PolyMofs as efficient drug delivery systems were systematically summarized.

PP-70

Automatic irrigation system using moisture sensor

N. Karthik[a], G. Hariharan[a] and A. Arivarasan[a*]

[a] *Multifunctional Materials Laboratory, Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

**Corresponding Author: arivarasan.nanotech@gmail.com*

A simplest method to monitor the automatic irrigation system using a moisture sensor was reported. In this work, a moisture sensor was used to detect the humidity in the soil (agricultural field) and supply water to the field which has water requirement. The proposed system utilize the 8051 microcontroller-based design to controls the water supply and the field to be irrigated. These moisture sensors, which were present in the fields, were activated only if the water/ moisture level was very poor. Once the field gets dried, sensors sense the requirement of water in the field and send a signal to the microcontroller. Then the microcontroller based design, allow the water flow to the corresponding filed, until the signals received. In case, when there were more than one signals received for water requirement, then the microcontroller will prioritize the first received signal and irrigate the fields accordingly. The development of the automated irrigation system based on microcontrollers and wireless communication at experimental scale within rural areas was presented. The aim of the propose work was reducing the water usages.

PP-71

Rime power three mean labeling of some special classes of graphs

G. Chitra

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil, Tamilnadu, India.

Email: g.chitra@klu.ac.in

A graph G with p vertices and q edges is said to be prime power three mean graph if it is possible to label the vertices as f :VG→{ 1, 2, …, q+1} such that every adjacent vertices satisfies the condition that g.c.d (f(u), f(v)) = 1 and also each edge e = uv is labeled with f e=uv= ⌈u3+ v3213⌉ or ⌊u3 + v3213⌋ then all the edge labels are distinct. In this case f is called prime power three mean labeling of G.

PP-72

Colorimetric sensor for cucurbiturils and surfactants

N. Selvapalam*

Center for Supramolecular Chemistry, International Research Center, and Department of Chemistry and, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu

n.selvapalam@klu.ac.in

Cucurbit[n]urils (CB[n], n = 5-14) are developed from the sources of glycoluril and formaldehyde and provided various sized host molecules for the development of various applications. The key parameter is the different sized hydrophobic cavity with the different water soluble properties. We have developed sensor for these hose molecules using graphene oxide and rhodamine B as these host molecules have wider applications in drug delivery and these fluorescence sensors will be very much supportive for the separation process by the HPLC as the cucurbiturils are not having the chromophore groups.[1] Similar strategies can be extended to the sensing of functionalized cucurbiturils. However, these graphene oxide tethered rhodamine B was unable to provide the fluorescence on for the cyclodextrin host molecules. In a similar way, we also found the highly selective sensor for cucurbit[7]uril alone under the unique conditions. Besides, we have developed sensors for biomolecules such as thiamine, Adenosine phosphates such as ATP, ADP and AMP using similar strategies. Surfactants are the molecules which are environmentally benign. We have developed sensors for surfactants using the graphene oxide based materials.[2] We have also prepared several tailor-made graphene oxde tethered dye molecules for the sensing of various molecules of choice that include biomolecules, synthetic molecules and many others. Recent advancement on the sensor for cucurbiturils and their functionalized derivatives and sensor for various other molecules will be presented in detail.

PP-73

Rare earth Lanthanum co-doped Mn:SnO_2 NanoParticles for Photoluminescence applications

S. Sumathi[1,2] and S. Asath Bahadur[1,2*]

[1] *Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, 626126, INDIA.*

[2] *Condensed Matter Physics Laboratory, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil, 626126, INDIA.*

**Corresponding author: s.asathbahadur@klu.ac.in*

The pure, Mn doped SnO_2 and rare earth lanthanum co-doped SnO_2 nanoparticles synthesized by a simple hydrothermal method. The prepared nanoparticles were investigated by means of X-ray diffractometer, raman, scanning electron microscopy with energy dispersive X-ray spectroscopy, UV-visible spectrophotometer and photoluminescence spectroscopy. The samples were crystalline with rutile structure of undoped and doped SnO 2 nanoparticles. The band gaps of the prepared nanoparticles of 3.54 to 3.81 eV, determined from UV-visible absorption spectral results. The effects of La and Mn doping different rare earth concentration on photoluminescence of the nanoparticles were further studied, and the luminescence mechanism was also discussed.

PP-74

Construction and selection of variables resampling scheme based on double specification limits

S. Sridevi and S. Balamurali

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Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil 626 126.
E-Mail: sridevi1518@rediffmail.com

In this paper, we propose a designing methodology of a variables sampling plan for resubmitted lots and the sampling plan is also known as a resampling scheme, which was originally proposed by Govindaraju and Ganesalingam (1997). The proposed sampling plan can be applied for the inspection of measurable quality characteristic which has double specification limits. This plan can be applied under the condition that the quality characteristic under investigation is assumed to follow a normal distribution. The optimal plan parameters of the proposed variables resampling scheme are determined for known standard deviation situations to satisfy the producer's and consumer's risks at the corresponding specified quality levels. Symmetric cases based on the fraction nonconforming by the lower and the upper specification limits are also considered. The problem is formulated as a nonlinear programming where the objective function to be minimized is the average sample number and the constraints are related to a lot of acceptance probabilities at acceptable quality level and limiting quality level under the operating characteristic curve. Advantages of the proposed plan are also investigated. It is also shown that the proposed plan outperforms compared to other existing variables sampling plans based on double specification limits.

PP-75

Fluorescence-based sensing of thiamine using supramolecular stacked graphene oxide and rhodamine b (GORdB)

M. Guru Dharneesh, S. Jebakumari, S. Sudha, R. Pavitra, K. Karpagalakshmi, P. Lakshminarayanan, N. Selvapalam

[a] *Center for Supramolecular Chemistry, International Research Center and Department of Chemistry, Kalasalingam Academy of Research and Education (Kalasalingam University), Krishnankoil, Tamil Nadu State, INDIA 626 126*

**e-mail:* n.selvapalam@klu.ac.in

Thiamine deficiency poses a great deal of concern for many diseases; therefore, it is desirable to have a simple way to detect the condition. Developing a direct, selective, and sensitive method for detecting thiamine in samples like blood, tissues, plasma, food, and drugs is challenging for researchers. However, in many cases, Thiamine has not been detected directly; it has been detected through oxidation. In order to accomplish this, we have developed a new thiamine sensor based on the Rhodamine tethered graphene oxide (GORdB) The supramolecular stacked complex developed here is a direct thiamine sensor that does not require any additional agent. The supramolecular stacked GORdB offers a sensitive and selective sensing potential for Thiamine (vitamin B1). GORdB also showed good sensitivity towards thiamine to the maximum of 10^{-7} M concentration. Therefore, this new graphene-based material could be a handy tool for detecting Thiamine with good selectivity and sensitivity.

PP-76

Fabrication, Characterization, and Electrical Properties of Sputter-Coated Silver Thin Films

E. Subbaram[a] and J. Naidu Dhanpal[a]*.

*Plasmonic Research Laboratory, Department of Physics, Kalasalingam academy of research and education, krishnankovil-626126, INDIA.

*Corresponding author: Dhanpal@klu.ac.in

Thin film technology provides an immense role in sensors, device formation, and coatings. In the present work, Silver thin film is fabricated using DC sputtering. From SEM analysis the morphology of Ag was found to be a spherical shape with a size between 200 nm using Image J software. From the XRD analysis, the diffraction peaks in the Ag are found to be well-matched with the available literature (JCPDS, File No. 19-0629) data. In Raman studies, the peaks of silver at 885cm-1 confirm Ag-O bonding. An attempt has been made to find out the resistivity of silver film using the four-probe technique. The resistivity of film for 5-minute deposition shows that as the temperature increases the resistivity increases. This supports the theory of classical free electrons and well describes the properties of conductors. Ag is mostly used as metal contact for device applications. Four probes are one of the prominent techniques to find out the resistivity at a low cost. In the present work, the extracted parameters help one to study the properties of a silver thin film.

PP-77

Investigations of Color Image Segmentation Based on Connectivity Measure, Shape Priority and Normalized Fuzzy Graph Cut

P. Karthick

Department Of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil, Virudhunagr – 626126, India.

Email: p.karthick@klu.ac.in

The color images have different color components and variety of color intensity which makes segmentation very difficult. In this research paper, we use connectivity measure and shape priority of color image as a thresholding theme to separate an object from the background. To improve the performance of the segmentation of color images by introducing a normalized fuzzy graph cut measure based on standard S membership function. The implementation of the proposed algorithm known as the S fuzzy normalized graph cut (S-FNGC) method. The S-fuzzy normalized graph cut has been applied to handle the structural irregularities in color images.

PP-78

Soft chemical synthesis and characterization of Cu doped BaO nanocrystalline materials for photocatalytic applications

K. Mohamed Ibrahim, A. Samson Nesaraj*

Department of Chemistry, School of Advanced Sciences,
Kalasalingam Academy of Research and Education, Anand Nagar,
Krishnankoil-626 126, Tamil Nadu, India.
**Email address: samson@klu.ac.in*

Adequate purification of industrial waste water is a major problem in the modern world. Among the different waste water treatment procedures available, semiconductor based photocatalysis is found to be an efficient method to treat waste water containing organic dyes. In this research work, a set of Cu doped BaO ($Ba_{1-x}Cu_xO_{1-\delta}$; x=0, 0.10, 0.20, 0.30 and 0.40) nanocrystalline materials were prepared by simple chemical precipitation method. The prepared nanocrystalline materials were calcined at different temperatures such as 150, 300, 450 and 600 ^oC for 2 hours each to get the phase pure product. The prepared materials were characterized by X-ray diffraction (XRD), Fourier transform infrared (FT-IR) spectroscopy, Scanning electron microscope (SEM), Energy dispersive X-ray spectroscopy (EDAX), UV–Vis spectroscopy and PL spectroscopy techniques. The photocatalytic removal of Rhodamine B dye present in waste water was also examined in presence of the newly prepared catalysts under UV irradiation.

PP-79

Hydrothermal routed Rare Earth Sm^{3+} doped $SrSnO_3$ nanomaterial for bio-imaging Applications

S. Sebastian[1*], P. Diana[2], S. Saravanakumar[2] and C.S.A.Raj[1]

[1]PG & Research Department of Physics, Arul Anandar College, Karumathur, Madurai– 625 514, INDIA*

[2]Department of Physics, Kalasalingam Academy of Research and Education, Krishnan Koil, Tamil Nadu, INDIA.

speedseba@yahoo.co.in

In the present investigation, Sm^{3+} doped $SrSnO_3$ nanoparticles have been synthesized via the hydrothermal method with a samarium content of 0 to 5 wt.%. The effect of Sm^{3+} ion incorporation on the structure of the host materials was investigated utilizing X-ray Powder Diffraction (PXRD), and Field emission scanning electron microscopy (FESEM). The phase pure structure of the host materials was confirmed by PXRD. The crystallinity of the Sm^{3+} doped materials was considerably altered compared to the undoped samples. It also confirmed the incorporation of Sm^{3+} dopant at the substitutional sites of host systems. FESEM pictures supported the presence of sphere-like nanoparticles.

PP-80

Captive and majority domination number for flower snarks

T. Kalaiselvi and Yegnanarayanan Venkatraman

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamilnadu, INDIA

Email: t.kalaiselvi@klu.ac.in , Prof.yegna@gmail.com

The Flower Snarks are a family of 3- regular graphs. The computation of exact Captive domination number, Strong captive domination number, Half certified captive domination number, Majority domination number, connected majority domination number are considered here for Flower Snarks. Interesting real-life applications of these parameters are also probed.

PP-81

Gel from plastics

A. Mariyam Beevi[a], P. Raja[a], S. Jeganathan[a], R. Christya[a], S. Karan[a], S. Pharakath porose[a], R. Pavitra[a], K. Karpagalakshmi[a], P. Lakshminarayanan[a], N. Hariram[b], N. Selvapalam[a]

[a]*Center for Supramolecular Chemistry, International Research Center and Department of Chemistry, Kalasalingam Academy of Research and Education (Kalasalingam University), Krishnankoil, Tamil Nadu State, INDIA 626 126*

[b] *Department of Biotechnology, Kalasalingam Academy of Research and Education (Kalasalingam University), Krishnankoil, Tamil Nadu State.*

**e-mail: n.selvapalam@klu.ac.in*

Due to the film's nature, durability, and ease of carrying, plastic products have become increasingly popular in recent years. The purpose of this study is to explore the most suitable and efficient method to recycle and reuse plastic from waste/dumped plastic. The use of a suitable method will minimize the volume of dumped plastics or used material. Regarding the concern, we have created a method to dissolve plastics using oil, which can be applied in a number of ways. We used polythene bags which are cheaply available at the local market for the experiments. Plastics and oil were heated in order to make miscible plastics. Polythene and oil were mixed together heated that material to create oil miscible plastics. Finally, a gel-like substance was obtained and it was examined for antibacterial activity. In this case, Pseudomonas aeruginosa, gram-negative bacteria were used in the culture and the results will be discussed and further studies are in progress.

PP-82

Structural analysis and bonding behavior of Zn_2SiO_4

P. Diana[1] and S. Saravanakumar[1*]

Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil 626 126, Virudhunagar, INDIA.

Email: saravanaphysics@gmail.com

In this work, pure Zn_2SiO_4 phosphors were prepared using a simple hydrothermal process. The synthesized sample was structurally characterized by powder X-ray diffraction and the Rietveld refinement technique. The powder profile refinement of X-ray data authenticates that the synthesized Zn_2SiO_4 has been crystallized in a face-centred rhombohedral structure. The structure factors extracted from the Rietveld technique have been utilized for the construction of electron density distribution in the unit cell, which employs the technique called the Maximum Entropy Method (MEM). The bonding characteristics of the Zn_2SiO_4 materials have been analyzed. The nature of the bond and the number of electrons along the Zn and O bond path are analyzed through the charge density analysis.

PP-83

Prime distance graph on Jn- snark

J. George Barnabas and Yegnanarayanan Venkatraman

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil 626126, Tamilnadu, INDIA

georgebarnabas@klu.ac.in , Prof.yegna@gmail.com

Let G be a graph. G is a prime distance graph if it's vertices are labelled with distinct integers and the difference between vertex labels of any two adjacent vertices are prime numbers. It is known that any bipartite graph and any cycle graph are prime distance graphs. In this paper generalized Jn - Snark graph is defined and some interesting results about this graph are obtained.

PP-84

The effects of paddy and black gram seed priming with zinc oxide nanoparticles on plant growth

D. Asha Joy and P. Devendran*

Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, INDIA.

**Email: p.devendran@klu.ac.in*

The effects of seed priming with zinc oxide (ZnO) nanoparticles (nps) on the growth and cadmium (Cd) accumulation by rice and black gram were investigated. Seeds of rice and black gram were primed with different concentrations of either ZnO NPs (0, 25, 50, 75, and 100 mg) for 24 h by continuous aeration and then the seeds were spread in a soil which was contaminated with cd due to long-term application of sewage water. Plants were grown till maturity under natural conditions with 60-70% moisture contents of total soil water holding capacity throughout the experiment. Plant height, spike length, and dry weights of shoots, roots, spikes, and grains were increased with NPs, in particular with the higher rates of NPs. The results are discussed.

PP-85

A material selection model using fuzzy logic approach

V. Tharakeswari[1], M.Kameswari[2] and S.Kavitha[3]

[1]*Research Scholar, Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil, Virudhunagar-626126, Tamilnadu, India*

[2*]*Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil, Virudhunagar-626126, Tamilnadu, India*

[3] Department of Mechanical Engineering, Kalasalingam Academy of Research and Education, Krishnankoil -626126.

Email:thara.maths@gmail.com

The material selection process for choosing the right material for a certain engineering component is presented in this work utilizing a fuzzy logic approach. Material selection is a big challenging issue in the field of design and development of products for various engineering applications. For the selection of materials, a novel numerical method is suggested. This methodology uses a modified digital logic method along with non-linear normalization, and it is based on the well-known weighting factor approach. The suggested mathematical formulas and how they relate to the process of choosing materials. The methodology's key benefits are that it takes into account the ambiguity, unpredictability, and fuzzy nature of the decision-making process.

PP-86

Ultrasonic studies on diesel and biodiesel blends

M. S. Revathy[1]*, P. Sasikumar[2] and R. Jansi[1]

[1]*Department of Physics, Kalasalingam Academy of Research and Education, Tamil Nadu, INDIA.*

[2]*Department of Physics, Saveetha School of Engineering, Chennai, Tamil Nadu, INDIA.*

Diesohol is a significant substitute for diesel that is made of a blend of ethanol and diesel. The miscibility of the fuels' component poses a significant obstacle, though. This article discusses the impact of biodiesel (B) as an additive on the molecular interaction studies that stabilize the diesel-ethanol blend. The results were obtained experimentally by measuring the viscosity, density, and ultrasonic velocities. They were then further refined by elucidating a few relevant thermo-acoustical factors. It has been found that the effects of biodiesel as an addition in a diesel-ethanol blend improve the stability of the fuel mixture against the immiscibility of the system in particular percentage ratios. According to the results, blend ratios like D-80% + B15% + E-5% and dispersive interactions have increased stability. The compositions of D-85% + B-10% + E-5%, D-80% + B-15% + E-5%, and D-80% + B-10% + E-10% likewise displayed excellent concordance with pure diesel. Hence, research on molecular interactions offers a fascinating perspective on the formation of diesohol.

PP-87

Applications of medical diagnosis using pythagorean fuzzy sets

M. Maheshpraba[1] and M. Kameswari[2]

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil - 626 126.

Email: m.maheshpraba@klu.ac.in

Fuzzy set theory carries an enormous improvement in all scientific and research fields. It initiated several applications both in theoretical and practical studies. Intuitionistic fuzzy sets are an extension of fuzzy sets. Pythagorean fuzzy set is a next stage of intuitionistic fuzzy set. Diagnosis is an unavoidable preliminary part to any disorder and disease. Perferection in diagnosis evades long term treatments. In this paper, we use pythagorean fuzzy sets to aid diagnosis in the medical field

PP-88

Transformation of plastics into activated carbon for adsorption of dyes

P. Sentamil Selvan, G. Malavika, M. Priyadharshini, R. Pavitra, K. Karpagalakshmi, P. Lakshminarayanan, N. Selvapalam.

Center for Supramolecular Chemistry, International Research Center and Department of Chemistry, Kalasalingam Academy of Research and Education (Kalasalingam University), Krishnankoil, Tamil Nadu State, INDIA 626126

**e-mail: n.selvapalam@klu.ac.in*

Polymers and dyes are two major types of pollutants, they are toxic to humans and animals. A suitable method is required for solving this problem in recent years. In this study, the waste plastic was converted into activated carbon through simple carbonization. This study provides an effective means to remove Methylene blue and Rhodamine B dyes via adsorption over activated carbon as an adsorbent. The prepared activated carbon (ACs) was demonstrated as an adsorbent for organic dye removal without additional irradiation. The maximum removal of 99.7 % was achieved from an organic dye of high concentration of 10^{-3} M, using 100 mg of the material. It was found that ACs prepared at 400 ^{0}C made good adsorbents. Cleaning polluted water is an important task for cleaning the environment and indeed the present method is cost-effective, and the burnt plastics are available cheaply, which can be used in dye industries to eliminate the polluted dyes. The dye absorption properties will be presented and further studies are in progress.

PP-89

Synthesis and Characterization of Nickel Ferrite Nanoparticles for Improved the Plants Growth and Reduced The Oxidative Stress and Cadmium Concentration in Rice and Black Grams

M.Ajitha, T.Theivasanthi *

Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, India.

**Email: t.theivasanthi@klu.ac.in*

Abstract

The effects of seed priming with nickel ferrite ($NiFe_2O_4$) nanoparticles (nps) on the growth and cadmium (cd) accumulation by rice and blackgram were investigated. Seeds of rice and blackgram were primed with different concentrations of either nickel ferrite nps (0, 5, 10, 15 and 20 mg) for 24 h by continuous aeration and then the seeds were sown in a soil which was contaminated with cd due to long-term application of sewage water. Plants were grown till maturity under natural conditions with 60-70% moisture contents of total soil water holding capacity throughout the experiment. Plant height, spike length, and dry weights of shoots, roots, spikes, and grains were increased with nps, in particular with the higher rates of NPs.

Prime and co-prime edge anti-magic vertex labeling of families of uni - cyclic graphs

A. Vishnupandi[1], Dr.G.Chitra[2]

[1]*PG Student, Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil.*

[2] *Assistant Professor, Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil.*

A graph which is defined as prime anti-magic labeling is always a finite and have a simple undirected graph contains $|V| = p$ *and* $|E|$ = q and it has an injection mapping f: V → {1, 2, …. p} and every pair of adjacent vertices u and v satisfies the condition that greatest common divisor between the vertices are 1. The induced edge labeling generated by f*(e = uv) = f(u) + f(v) are all distinct. If the graph vertices have assign by prime labeling, then it is called as co-prime. In this research we prove the new classes of uni-cyclic graphs admits prime and co-prime anti-magic labeling condition and also they are satisfied the condition of odd prime anti-magic labeling.

Hierarchically structured MFI and Beta zeolite using cattle feed agricultural waste material as hard template

K. Manikandan[a] and M.Swaminathan[a*]

[a]*Nanomaterials Laboratory, Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil, Tamil Nadu, India*

email: m.swaminathan@klu.ac.in

Hierarchicalbeta and ZSM-5 zeolites were hydrothermally synthesized by using corn stem pith powder as added template. The physicochemical properties of the catalysts were studied by means ofpowder XRD, TEM, N_2 adsorption, ^{27}Al MAS NMR, TPD of NH_3, FTIR and thermogravimetric analysis (TGA) techniques. Theprepared zeolites were found to havenon uniform meso/macroporesin addition to the intrinsic micropores. ^{27}Al MAS NMRspectra confirmed the presence of Alin tetrahedral frameworkof zeolites. Presence of strong acid sites was observed by TPD of ammonia. The hierarchical zeolites exhibited enhanced catalytic activity for esterification of levulinic acid (LA) with 1-propanol and 1-heptanol. Further the zeolites showed stable catalytic activity even after fifth cycle while conventional and commercial zeolites got deactivated when reused.

PP-92

Synthesis and characterization of annealed CuO by Co-precipitate method

S. Shenbagamoorthi[a], R. Premkumar[b] and J. Naidu Dhanpal [a]*

[a]*Plasmonic Research Laboratory, Department of Physics, Kalasalingam academy of research and education, krishnankovil-626 126, INDIA.*

[b]*N.M.S.S.Vellachamy Nadar college, Nagamalai-625 019, INDIA.*

**Email ID: dhanpal@klu.ac.in*

Copper is a coin-age metal and it has many specified properties. Copper has a wide range of applications and it is a good conducting material. In the present was work analysis copper oxide (CuO) at an annealing temperature. The XRD report confirms the crystalline nature and presents of copper oxide. Annealing at different temperatures the material shows the crystalline nature of the substrate decrease because the sharpness of the peak moves too broad. The SEM shows the flower-like morphology. The UV spectrum is one of the pieces of evidence for the prepared CuO is a semiconductor. The Tauc plot gives the value of electron volts. Now semiconductors play a significant role in most electronic thinks. The above data helps to develop and improve the ability of copper oxide in semiconductor applications.

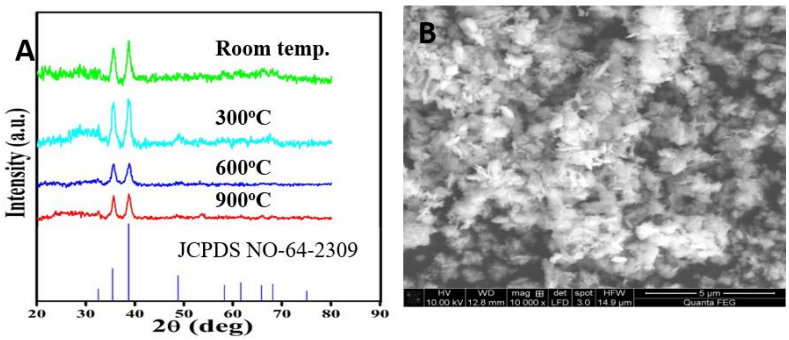


Figure 1. A) XRD report of Copper Oxide (CuO). B) SEM image of CuO

PP-93

Forecast outcome t20 matches with machine learning approach

I. Aswadhram, M. Kameswari, R. Raja Subramanian

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, India

The method for forecasting the result of an ongoing cricket match is presented in the paper. The quality of the team's players and their current form, along with the toss, host advantage, and day/night match factors, all contribute to a reliable prediction. The player quality and team form are measured using a unique method. At each stage, the explanatory strength of the available parameters is evaluated to determine which ones to add to the model and which ones to replace in order to make predictions that are accurate. Due to the fact that these factors fluctuate as the game goes on, dynamic logistic regression is used to quantify them. The model is evaluated against several T20 matches and an accurate prediction is observed. The model is considered in different scenarios as the match progresses.

PP-94

Silver nanoparticles for decolorization and biodegradation of azo dye compound

A. Krishnakumar, B. Sumithra, and D. Geetha

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil, 626126, Tamilnadu, India

sumithrab1998@gmail.com

The present research work focus on the synthesis of silver nanoparticles their efficiency for bioremediation of murexide dye. After that Silver nanoparticles were synthesized using silver precursor. Silver nitrate were used as precursor at different concentration for silver nanoparticle synthesis. Color change from colorless to brownwas observed synthesis of silver nanoparticles was further confirmed by UV Visible spectroscopy. The silver nanoparticles formation was (5-93 nm in size) also confirmed by Transmission electron microscopy, Particle size analyzer, Dynamic light scattering depending on the concentration of silver precursor. Dye decolorization and biodegradation was studied using silver nanoparticles, silver resistant bacteria and silver resistant bacteria influced by silver nanoparticles separately. Nano based bioremediation was found 63 % efficient than the microbial remediation. Thus the developed nano-bioremediation technology is biocompatible, simple and reliable method and can be applied to decolorize dye as well as antimicrobial agent.

PP-95

The structural, morphological, optical and electrical Properties of Pb doped cu_2o thin films grown by nebulizer spray technique

S. Santhosh Kumar Jacob[1*]

[1*]*PG and Research Department of Physics, The American College, Madurai, Tamil Nadu, INDIA.*

Thin films of undoped Cu_2O and Pb-doped Cu_2O were deposited using the nebulizer spray technique. The lead was introduced by three different concentrations (undoped, 3%, 5% and 7%). The samples were analysed with XRD (X-ray diffraction), SEM (scanning electron microscope), UV-Vis spectroscopy, Raman spectroscopy measurements, FTIR and current-voltage (I-V). The films produced were in the cubic phase, with high purity and crystallinity, according to XRD structural characterization. The grain size of Cu_2O films is affected by the Pb concentration and decreases as the Pb concentration increases, although the strain and dislocation density values increase as the Pb doping ratio increases. SEM images clearly shows the grain boundaries and morphologies of the samples varied with Pb doping concentration. Absorption measurements showed that bandgaps of samples were increased from 2.13 ev to 2.64 ev and transmittance of samples were decreased with increasing Pb doping concentration. The structure of Cu_2O thin film was confirmed in all films by Raman and FTIR studies. I-V measurements illustrated that the electrical conductivity of Pb doped Cu_2O is higher than undoped Cu_2O and the Pb doped Cu_2O samples resistant increased in rising Pb dopant in Cu_2O.

PP-96

Estimation of overlapping coefficient measures of inverse Pareto population

C. Nandhini* and Indrajeet Kumar

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, India

Overlapping coefficient is a direct measure of similarity between two populations which is recently becoming very useful in many fields of applications including microarray analysis for the purpose of identifying deferentially expressed biomarkers, especially in case when data follow multimodal distribution. In this article, we developed classical inferences about the three well-known measures of overlapping coefficients, namely Matusita's measure, Morisita's measure and Weitzman's measure for two inverted Pareto population. The maximum likelihood estimates and asymptotic confidence intervals of overlapping coefficient measures are derived. In order to measure the precision numerically, we performed a Monte Carlo simulation.

PP-97

Highly efficient visible-light photocatalytic degradation and antibacterial activity by novel Ag/Er_2O_3@CuO nanocomposite

K. Tamilselvan[1], M. Arunpandian[2], E.R. Nagarajan[1,*]

[1]*Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

[2]*Department of Chemistry, P.S.R Engineering College, Sevalpatti, Sivakasi-626140, Tamilnadu, INDIA.*

E-mail: nagarajanklu@gmail.com

In this scenario, the novel Ag/Er_2O_3@CuO nanocomposite was synthesized by a cost-effective, easy, and eco-friendly hydrothermal method for highly efficient visible-light photocatalytic degradation of amaranth (AM) dye and antibacterial activity against the bacterial pathogens like *Bacillus cereus, Listeria monocytogenes, Vibrio culture, Serratia marcescens, Haemophilus influenza* and *Aeromonas.* The physicochemical properties of Ag/Er_2O_3@CuO nanocomposite were determined by UV-Vis spectroscopy, X-ray diffraction (XRD), scanning electron microscope (SEM) and energy dispersive X-ray (EDX) spectroscope and X-ray photoelectron spectroscopic techniques. In XRD results indicates the peak intensity of Ag/Er_2O_3@CuO nanocomposite. Greater zones of inhibition between the activities of each nanocomposite were indicative of the greater sensitivity of these bacteria. When compared to other regions, Ag/Er_2O_3@CuO zones performed exceptionally well. Within 60 minutes, the AM dye had been totally corroded via photocatalytic breakdown. Ag/Er_2O_3@CuO nanocomposites' antibacterial efficacy against *Bacillus cereus, Haemophilus influenzae,* and *Aeromonas hydrophila* was attributed to their wide surface area, increased reactivity as a result of their reduced size, and increased formation of reactive oxygen species (ROS). In the photocatalytic degradation process, the AM dye was completely mineralized within 60 mins. The optical parameters were also explained.

PP-98

Investigations on the Zinc Vanadate NPs loaded rGO nanocomposites as an efficient electrode material for high performance supercapacitors

M. Babu[a], G. Hariharan[a], S. Arunpandiyan[a] and A. Arivarasan[a]*

[a]*Multifunctional Materials Laboratory, Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

**Corresponding Author: arivarasan.nanotech@gmail.com*

Zinc vanadate nanoparticles loaded reduced graphene oxide ($Zn_3(VO_4)_2$@rGO) based nanocomposites (NCs) were synthesized through a simple reflux method and their electrochemical performances were reported. The structural, functional group and surface morphological properties of the prepared NCs were analyzed by, X-ray diffraction, FT-IR, and scanning electron microscopy analyses. A working electrode was fabricated through a doctor blade method and it's performances were tested under three electrode configuration using 1M KOH as the electrolyte solution. Fabricated working electrodes based on the pure $Zn_3(VO_4)_2$ NPs and $Zn_3(VO_4)_2$@rGO NCs, displayed the outstanding specific capacitance values of 193 and 1910 Fg^{-1} at 5 mVs^{-1}, respectively. Whereas the specific capacitance values calculated from the GCD analysis were found to be 1315 Fg^{-1} for $Zn_3(VO_4)_2$@rGO NCs, and 53.7 Fg^{-1} for $Zn_3(VO_4)_2$ at a current density of 1 Ag^{-1}. An asymmetrical type supercapacitor was fabricated using $Zn_3(VO_4)_2$@rGO NCs modified working electrode as the cathode and rGO modified Ni foam as the anode. The fabricated device possessed the superior power and energy densities of 2050 W kg^{-1} and 13.13 W h kg^{-1}, respectively. Furthermore, the fabricated device demonstrated the superior cyclic retention of 97.5% after the 2000 GCD cycles.

PP-99

Neutrosophic set and its application in covid-19

M. Maheshpraba[1], M. Kameswari[2]and M.Kathirvelan[3]

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil - 626 126.

Email: m.maheshpraba@klu.ac.in

Every decision making process in an uncertain environment must take fuzziness into consideration. To deal with the fuzzy decision making environment, many tools and methods have been developed. The neutorsophic set is one of the newest method for handling uncertainty. The intuitionistic fuzzy set is a generalization of the neutrosophic set. Hence, decision making models using neutrosophic set outperform IFS decision making in real world imprecise problems. We inspected the definition of neutrosophic set and its properties in diagnosing covid-19 illness.

PP-100

Decoration of affordable rGO @ MnO_2-NiO nanocomposite for enhancement of photocatalytic and supercapacitor performance

R. Akash[1], M. Arunpandian[2], E. R. Nagarajan[1,*]

[1]*Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

[2]*Department of Chemistry, P.S.R Engineering College, Sevalpatti, Sivakasi-626140, Tamilnadu, INDIA.*

E-mail: nagarajanklu@gmail.com

The current study is based on the synthesis and characterization of MnO_2-NiO/rGO nanohybrid for photocatalytic degradation of organic pollutants. The physicochemical properties of synthesized products were estimated by X-ray diffraction technique (XRD), Fourier transform infrared spectroscopy (FTIR), Field emission-scanning electron microscopy (FESEM), and Ultraviolet - Visible spectroscopy. The diffraction data showed the formation of binary metal oxide nanocomposite, containing MnO_2 in hexagonal whereas NiO in the cubic crystalline phase. The spectroscopic results were found to be in close agreement with XRD data. The morphological analysis exposed the nanorod and flower like morphology of the product. The visible light assisted photocatalytic degradation outcome showed above 95% degradation of Amaranth dye with different reaction conditions using MnO_2-NiO/rGO nanohybrid. Moreover, the experiment showed that hydroxyl radicals, electrons, and holes were the main active species during the degradation mechanism. In contrast to the MnO_2-NiO nanocomposite, the MnO_2-NiO/rGO nanohybrid exhibited greater degradation efficiency. This superb photocatalytic performance of ZnO-NiO/rGO nanohybrid proved to be a durable candidate in the field of catalysis.

PP-101

Improving the conductivity of tamarind seed polysaccharide - based polymer electrolytes by blending with iota-carrageenan

D. Vanitha[a*] and P. Saranya[b]

[a]*Department of Physics, Kalasalingam Academy of Research and Education, 626126, Tamilnadu, INDIA.*

[b]*Multi-Functional Materials Laboratory, International Research Center, Kalasalingam Academy of Research and Education, 626 126, Tamilnadu, INDIA.*

Corresponding Author Email Id: vanibala2003@gmail.com

Due to a lack of renewable energy sources, the development of electrochemical energy devices including batteries, fuel cells, and super capacitors has received attention in the modern era. The synthesis of polymer electrolytes has recently become more practical using natural, widely accessible, non-toxic, biocompatible, and biodegradable biopolymers and polysaccharides. Due to its stabilizing, thickening, and gelling properties as well as its function as an emulsifying agent, tamarind seed polysaccharide, a biopolymer derived from tamarind seeds, finds use in the food, cosmetics, pharmaceutical, and dyeing industries. Particularly, materials that conduct protons are of great importance for the creation of electrochemical devices. In this context, The new blend biopolymer electrolyte, Tamarind Seed Polysaccharide(TSP) and Iota-Carrageenan (IC) was prepared by using a technique called solution casting. The XRD method has revealed the polymer electrolytes' amorphous nature. By using the AC impedance spectroscopy, the dielectric parameters complex dielectric and tangent loss were examined .According to the measured ionic conductivity values, the biopolymer comprising 40wt%TSP + 60wt%IC had the highest ionic conductivity, measuring 1.23×10^{-6} S/cm. Due to the creation of charge transfer complexes, the electrical conductivity increased as the concentration of dopants rose.

PP-102

Classification of Image segmentation of gray scale image by various methods

J. Jeyasingarapriya[1] and P. Karthick[2]

[1,2]*Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankovil-626126*

Image segmenation is of great importance in understanding and analysing objects within images. Using segmentation and subsequent colour density evaluation, the procedure entails turning hazy images into meaningful and practical ones.Medical and industrial areas, among others, frequently use the image segmentation method. Finally, we understood and implemented the different kinds of image segmentation methods. This paper will discuss four important types of image segmentation methods with a few example images. From these methods we will find one method which gives more output results.

Enhanced antibacterial and photocatalytic activity under visible light using CuO@ZnO nanostructures by hydrothermal method

S. Muralidharan[1], M. Arunpandian[2], E.R. Nagarajan[1,*]

[1]*Department of Chemistry, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, INDIA.*

[2]*Department of Chemistry, P.S.R Engineering College, Sevalpatti, Sivakasi-626140, Tamilnadu, INDIA.*

E-mail: nagarajanklu@gmail.com

Use a single activity resource and the method that has been used in the present work to address the two challenges. The produced ZnO@CuO under visible light irradiation efficiently decomposed the organic dye methyl orange (MO) and medication ciprofloxacin (CIP). The hydrothermal approach has been used to prepare the monoclinic structured copper oxide (CuO), hexagonal structured zinc oxide (ZnO), and mixed phase of ZnO@CuO. By using powder X-ray diffraction (P-XRD) and the Rietveld refinement technique, the structural characterisation of produced materials has been examined. SEM characterisation has been used to measure the surface morphology of synthetic materials. Photoluminescence (PL) characterization has been used to examine the luminescence performance of produced materials. According to the photocatalytic data, the ZnO@CuO compound is a strong contender for the degradation of the antibiotic medication ciprofloxacin and the colour methyl orange. According to the results, the ZnO@CuO nanomaterial is shown good photocatalytic action for the degradation of CIP and MO under stimulated sunlight with the efficiency of above 95%. Additionally, the ideal parameters for the degradation process were examined. On the other hand, the antibacterial activity of the nanomaterial CuO@ZnO was studied.

PP-104

Superior performance of spinel cubic Structure $NiZnFe_2O_4$ electrode material for energy storage application

M. Mayakkannan[a,b], V. Siva[c], A. Murugan[a,b] , A. Shameem[c] , S. Asath Bahadur[a,b] and S. Thangarasu[a,b*]

[a]*Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, Tamilnadu 626126,*
[b]*Condensed Matter Physics Laboratory, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil 626126,*
[c]*Department of Physics, Karpagam Academy of Higher Education, Coimbatore 641 021, Tamil Nadu, INDIA.*
**E-mail: sthangarasu@gmail.com*

Nanosize $NiZnFe_2O_4$ NPs were prepared by simple microwave-assisted method, and their use as an electrode material for supercapacitor application. The structural and morphological studies of $NiZnFe_2O_4$ were characterized by XRD, FTIR and SEM. The magnetic and optical characteristics were examined by DRS-UV and VSM. The electrochemical performance of the $NiZnFe_2O_4$ electrode was measured through the use of Cyclic Voltammetry (CV), Galvanostatic Charge-Discharge (GCD), and Electrochemical Impedance Spectroscopy (EIS). The CV analysis found two redox peaks, indicating that the $NiZnFe_2O_4$ electrode was pseudocapacitive behavior and had a high specific capacitance of 220.81 F/g obtained at a sweep rate of 5mV/s. The $NiZnFe_2O_4$ electrode has an excellent cyclic stability over 5000 cycles and a high energy density value of 9.133 Wh/kg with high power density value of 1375 W/kg. The overall results of this research pointed that $NiZnFe_2O_4$ NPs is verified to be a potential improved electrode for supercapacitor applications.

PP-105

Study of image segmentation of color image by various methods

K. Balamurugan[1] and P.Karthick[2]

[1,2] *Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankovil-626126, Tamilnadu,India*

In order to understand and analyze objects inside images, image segmentation is important. The process involves turning unclear images into meaningful and useful ones via segmentation and a subsequent evaluation of color density. The picture segmentation method is frequently used to the industrial and medical fields, among others. Finally, we understood and executed different image segmentation methods. In this the paper, four important kinds of methods for image segmentation will be discussed as well as some example images. One of these ways gives the best output results, as we will find.

PP-106

Electrochemical performance and optimization of $Nife_2o_4$ Nanoparticles by different facile synthetic approach for supercapacitor application

P. Karthikeyan[a,b], V. Siva[c], A. Murugan[a,b], A. Shameem[a,b] and S. AsathBahadur[a,b*]

[a]*Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil - 626 126, INDIA.*

[b]*Condensed Matter Physics Laboratory, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil - 626 126, INDIA.*

[c]*Department of Physics, Karpagam Academy of Higher Education, Coimbatore 641 021, Tamil Nadu, INDIA.*

**E-mail: asathbahadur@gmail.com*

Transition Metal ferrites have excellent electrochemical properties due to the many oxidation states of the metal ions, making them materials for sustainable energy conversion and storage and promising solutions to emerging environmental problems. Nickel Ferrite ($NiFe_2O_4$) has been prepared by different synthetic techniques via hydrothermal, microwave-assisted combustion and Sol-Gel methods. The structural single-phase nature has been analysed by XRD pattern reveals the material belongs to cubic spinel structure. The surface characteristics and elemental composition of the $NiFe_2O_4$ has been studied by means of field emission scanning electron microscopy (FESEM), as well as energy dispersive spectroscopy (EDS). VSM study confirmed it is a ferromagnetic type material. Using a three-electrode system, the electrochemical performance of the prepared nanomaterial is assessed by cyclic voltammetry, electrochemical impedance spectroscopy, and galvanostatic

process in 3 M KOH electrolyte.

PP-107

On reliability estimation for progressively censored inverse topp-Leone population

J. Madhumathi* and Indrajeet Kumar

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, India

In this article, we estimate the associated parameter, reliability and hazard functions for inverse Topp-Leone distribution using maximum likelihood estimationbased on the progressively censored data.Moreover, approximate confidence intervals are constructedbased on the normal approximation to maximum likelihood estimate. In order to constructthe asymptotic confidence interval of the reliability and hazardfunctions, it is required to find their variances. These are approximatedby delta method. A numerical study is performed to comparethe proposed estimates with respect to their average values andmean squared error using Monte Carlo simulations. Moreover, alifetime data is are considered forthe demonstrative purposes of the considered methodology.

PP-108

Enhanced electrochemical performance of Bi_2O_3/ZnO;rGO for high-performance supercapacitors

V. Shanmugapriya[a], S. Arunpandiyan, B. Selvakumar[b] and A. Arivarasan[a]*

[a]*Multifunctional Materials Laboratory, Department of Physics, International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, INDIA.*

[b]*Department of Physics, Sri Eshwar College of Engineering, Coimbatore – 641 202, Tamilnadu, INDIA.*

**Corresponding author: arivarasan.nanotech@gmail.com*

Supercapacitor performances of Bismuth oxide/Zinc oxide loaded reduced graphene oxide (Bi_2O_3/ZnO:rGO - BZR) nanocomposites (NCs) were reported. A simple one-pot hydrothermal method was adopted to prepare BZR NCs and the prepared NCs were analytically characterized by XRD, FT-IR, SEM, and HRTEM analyses. XRD analysis confirmed the presence of hexagonal-structured ZnO and monoclinic-structured Bi_2O_3 nanoparticles in BZR NCs, respectively. The presence of ZnO nanoflowers and Bi_2O_3 nanolayers loaded rGO nanosheets were identified by SEM and HRTEM analyses. The electrochemical characteristics of the BZR NCs were tested under 1 M potassium hydroxide (KOH) and redox additive electrolytes (RAE). The BZR NC-modified working electrodes possessed the superior specific capacitance of 2274 Fg^{-1} in RAE with the electrochemical capacitance retention of 89.67% after 5000 GCD cycles. Similarly, the fabricated BZR NCs-based asymmetrical supercapacitors revealed the highest specific capacitance of 449 Fg^{-1} with the energy and power density values of 17.99 $Whkg^{-1}$ and 2400 Wkg^{-1}, respectively under RAE. The proposed BZR NC-based electrodes with superior power and energy densities with high cyclic stability provided vital advantages for long-term commercial

applications.

PP-109

Thyroid nodules diagnosis using convolutional neural network nl

M. Kameswari, R. Raja Subramanian and A. Jayarani,

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamilnadu, India.

Email: m.kameshwari@klu.ac.in

One of the most widespread illnesses that can cause a variety of health issues is thyroid disease. Whether nodules are benign or malignant is the dilemma. Thyroid disease is thought to affect 42 million individuals in India, based on projections from a number of research on the condition. Deep learning algorithms or the other algorithms applied to the research of thyroid illness. Hyperthyroidism, hypothyroidism, and normal are the three subtypes of thyroid disease that we classify. As a result, we extract ultrasound image collection of thyroid nodules from a well reputed website. Both hypothyroidism and hyperactive thyroid disease are included in our imaging data set. In this work we propose a convolutional neural network for thyroid nodule diagnosis.

PP-110

Enhancement of photoluminescence in new $Sr_{0.65}Zn_{1.35-x}SiO_4:xEu^{3+}$ red phosphors with alkali metal ions co-doping for optoelectronics applications

V. Sivakumar[1] and A. Lakshmanan[2] and S. Saravanakumar[3]

[1] *Department of Physics, M. Kumarasamy College of Engineering, Karur-639113, INDIA.*

[2]*Saveetha Engineering College, Thandalam, Chennai-602105*

[3]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil-626126, Tamil Nadu, INDIA.*

[1]*Corresponding author: sivakumarvairan@gmail.com*

Eu^{3+} activated $Sr_{0.65}Zn_{1.35-x}SiO_4$ red-emitting phosphor has been synthesized by pyrolysis method using ammonium nitrate and urea as oxidizer and fuel, respectively, followed by sintering at 1000°C. The crystalline suture, luminescent properties and morphology of these phosphors were investigated on alkali metal ions co-doping. The phosphor, when excited by 394 nm, exhibits intense red emission peaking around 614 nm, typical for f–f electronic transitions of the Eu^{3+} ions. The incorporation of alkali metal ions Li^+, Na^+ and K^+ into $Sr_{0.65}Zn_{1.35-x}SiO_4:xEu^{3+}$ phosphor led to a remarkable increase in PL efficiency. The morphology of Li^+, Na^+ and K^+ co-doped phosphors showed porous in nature and rod-shaped micron particles. PL sensitivity of $Sr_{0.65}Zn_{1.31}SiO_4$ $^+$, $0.04Eu^{4+}$, K^+ is higher than Li^+, Na^+ (Fig.1) excited at 393nm and its a potential candidate for applications of a red phosphor with better colour chromaticity for PDPs, FEDs and n-UV LEDs.

PP-111

Robust stability for neural networks with time-varying delays and linear fractional uncertainties

A. Karthick and Dr. N. Padmaja

Department of Mathematics, Kalasalingam Academy of Research and Education, Virudhunagar, India.

The concept of stability and basic results associated are explored, firstly, in the project. Based on the studied concepts of stability, an exploratory study of the stability results given in the research article entitled “Robust stability for neural networks with time-varying delays and linear fractional uncertainties” for neural networks system is done. Finally, conclusion and direction for future work are drawn.

PP-112

Studies of vibrational characterization and electrical conducting of blend polymer electrolytes PVDF-HFP and PVP

N. Nallamuthu[a]*, M. Murugesan[b], P. Devendran[a,*] and M. Krishna Kumar[c]

[a]*Department Of Physics, Kalasalingam Academy Of Research And Education, Krishnankoil – 626126, INDIA.*

[b]*Dayananda Sagar Of Academy Of Technology And Management, Uthayapura, Bangalore- 560082, INDIA.*

[c]*Department of Physics and Electronics, CHRIST (Deemed to be University), Bengaluru-560 029, Karnataka, INDIA.*

** E- Mail Id: nnallamuthu001@gmail.com*

In order to improve solid lithium batteries, solution casting has been employed to create lithium-ion conducting copolymer electrolytes based on poly(vinylidene fluoride-co-hexafluoropropylene (PVDF-HEP)/ polyvinylpyrrolidone (PVP) blend polymers of various compositions for lithium nitrate salt added (PVP/ PVDF-HFP/$LiNO_3$). Utilizing Fourier-transform Infra-Red spectroscopy (FTIR) analysis, molecular bond identification in polymer electrolytes have been investigated and confirmed by figure a). By using AC impedance analysis, the electrical conductivities of solid polymer films have been investigated. Conductivity based on AC impedance analysis of Nyquist plot for PVP/ PVDF-HFP/ with different wt% $LiNO_3$ polymer electrolyte at room temperature shown Fig b). It is shown in Fig. c when the high conductivity sample follows the different temperature.

PP-113

Applications of the shortest spanning tree and path on graph theory

P. Vaitheeswaran & Dr. L. Seenivasalu Reddy

Department of Mathematics, Kalasalingam Academy of Research and Education, Virudhunagar, India.

The Spanning tree structure are mathematical models of real life shortest path salesman problem etc., Most of the real life problems are solved by using various mathematical method: Direct method, Indirect method, Contradiction, Contrapositive, Induction and Graph based method etc., In this work we consider the salesman type problem and the model these problems in the graphical way and find the minimum spanning tree of the graph and shortest path between two nodes.

PP-114

Electron density distribution studies of $CaWO_4$

S. Saravanakumar[1,*] and D. Sivaganesh[2]

[1]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnan Koil - 626 126, Virudhunagar, Tamil Nadu, INDIA.*

[2]*Department of Physical Techniques and Devices for Quality Control, Ural Federal University, Mira Str., Yekaterinburg, RUSSIA.*

S. Saravanakumar, Email: saravanaphysics@gmail.com

In this study, pure $CaWO_4$ has been synthesised using a simple co-precipitation method. The powder X-ray diffraction analysis identified the phase-pure tetragonal crystal system. The detailed structural interpretation was performed by the Rietveld refinement technique, which was done by the JANA 2006 software. The maximum entropy method (MEM) computation was used to analyse the electron density distribution of $CaWO_4$ to determine the internal bonding nature. The results of the MEM computation have been visualised by the software VESTA. The calculated electron density distribution results reveal that Ca-O has an ionic bond and W-O has a covalent bond.

PP-115

On two diophantine equations 7^x+〖19〗^y=z^2 and 7^x+〖91〗^y=z^2

R. Nikil Balan & Dr. R. Vimala Devi

Department of Mathematics, Kalasalingam Academy of Research and Education, Virudhunagar, India.

In this paper, we prove that both two Diophantine equations $7^x+19^y=z^2$ and $7^x+91^y=z^2$ have no non-negative integer solution where x, y and z are non-negative integers.

PP-116

Structural and bonding property analysis of Bi^{3+} doped $SrSnO_3$

B. Santhanam[1] and S. Saravanakumar[1,*]

[1]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnankoil - 626 126, Virudhunagar, Tamil Nadu, INDIA.*

*Corresponding author Email: saravanaphysics@gmail.com

In this study, Bi^{3+}-doped $SrSnO_3$ was synthesized via a hydrothermal route to study its structure the bonding properties. The crystallinity of the synthesized material was identified by powder X-ray diffraction analysis, which revealed the cubic crystal system with the space group of pm-3m. The detailed structural interpretation of Bi^{3+}-doped $SrSnO_3$ was done by the Rietveld refinement technique, which was employed by the software JANA 2006. Using the software DYSNOMIA, the electron density distribution analysis of a single unit cell of $SrSnO_3$ was performed by the maximum entropy method (MEM). According to

the electron density distribution analysis, in the single unit cell of $SrSnO_3$, Sn-O has a covalent nature, and Sr-O has an ionic character.

PP-117

Applications of graph theory in social media

K. Rajeswaran[1] and L. Sreenivasulu Reddy[2]

[1]*M.Sc., Mathematics, 4th Semester, Dept of Mathematics, KARE.*

[2] *Associate Professor, Dept of Mathematics, SAS, KARE.*

E-Mail: *992118006@gmail.com*

In the real world, the importance of social media is a part of the human beings in their daily activities. This social media provide many facilities including in their education, Doctor appointments from the hospitals, choosing friends and sharing knowledge etc., The problem of choosing friends and Educational Institution etc. is very complex task. To overcome this problem by designing the social medial structure interms of graphs and then analyze these structures. In our work, we continue to study the social media problem using mixed graphs with additional property each edge is may be assigned by more than one attributes. Here we consider the following attributes: Friend, Family, contemporary employ.

PP-118

Structural and electron density distribution analysis of $MgWO_4$

S. Saravanakumar[1,*] D. Sivaganesh[2]

[1]*Department of Physics, Kalasalingam Academy of Research and Education, Krishnan Koil - 626 126, Virudhunagar, Tamil Nadu, India*

[2]*Department of Physical Techniques and Devices for Quality Control, Ural Federal University, Mira Str., Yekaterinburg, Russia*

*Corresponding author Email: saravanaphysics@gmail.com

In this study, $MgWO_4$ was prepared using a simple co-precipitation method. X-ray diffraction analysis revealed that $MgWO_4$ has a wolframite-like monoclinic structure with space group P2/c (No. 13). The insight into structural parameters such as cell constants, interfacial angles, unit cell volume, unit cell density, structure factors, and so forth was refined by the Rietveld refinement technique done by the software JANA 2006. The electron density distribution of monoclinic structured $MgWO_4$ was calculated using the maximum entropy method (MEM) using the extracted structural parameters from the Rietveld technique. The density of electrons in the middle of the bonds revealed that Mg-O has an ionic nature and W-O has a covalent character.

PP-119

Copper doped nickel oxide and its composites with carbon nano flakes: synthesis, characterization and degradation of organic pollutants in waste water

V. Chandrakala, A. Samson Nesaraj*

Department of Chemistry, School of Advanced Sciences,
Kalasalingam Academy of Research and Education, Anand Nagar,
Krishnankoil-626 126, Tamil Nadu, India.
**Email address: samson@klu.ac.in*

There is a severe environmental threat to the world due to the discharge of pollutants from organic matter into the water. Research is currently being conducted in the field of sustainable water treatment processes which can improve the quality of water. As a result of its conspicuous nature, photocatalysis is not just an amazing tool for converting energy but also for purifying the environment from water pollution. For improving the degradation efficacy of the Cu-doped nickel oxide binary nanocomposites, Carbon Nano Flake (CNF) was used to form the Cu-doped NiO@CNF based nanocomposite materials. In this work, we have synthesized a set of $Ni_{1-x}Cu_xO_{1-\delta}$@CNF nanocomposites by a simple chemical precipitation method. The prepared nanocomposites were characterized by XRD, FTIR, EDAX, SEM, TEM, PL and UV to understand their structural, functional, elemental, micro-structural and optical properties. The photocatalytic behavior of the materials was studied especially in degrading the brilliant green organic dye present in water sample under UV irradiation.

PP-120

Fabrication of biodegradable PVA/PPP composite films for dry packaging applications

P. Sivaranjanaa*, N. Rajini b, S. Nandhinia, D. Sandhiyaa, R. Irulappana

a Department of Chemistry, Kalasalingam Academy of Research and Education,Krishnankoil -626126, TamilNadu, India.
b Department of Mechanical Engineering, Kalasalingam Academy of Research and Education, Krishnankoil –626126, TamilNadu, India.
p.sivaranjana@klu.ac.in

Fabricating a biodegradable packaging material is the requirement of this era to safeguard our planet from climatic change and waste management issues. Almost 55% of the wastes were generated from packaging material used for various purposes. We have developed a biodegradable PVA/PPP composite film for dry packaging. The Polyvinyl alcohol (PVA) water soluble, biodegradable polymer was taken as the matrix and pomegranate peel powder (PPP) the agro waste material was chosen as the filler material. The developed PVA/PPP composite films were characterized with FTIR, XRD and TGA, in order to explore the structural changes in the PVA/PPP composite films on the addition of PPP filler, the change in crystallinity of the matrix PVA and the thermal stability induced by the filler PPP. All these characterization revealed that the developed PVA/PPP composite films have better thermal stability over the matrix PVA. These PVA/PPP composite films can be used as packaging material for dry food substances, electronics and other materials free from moisture content. The fabricated PVA/PPP composite films were completely biodegradable and were developed via green synthesis without using any hazardous materials. Another advantage over the fabrication was the utilization of the filler material PPP which will reduce the solid waste in the environment.

PP-121

Molecular Interation of Surfactant and Polymer

S. Kanagavel, M. Karthik Kumar, B. Sumithra, D. Geetha

Department of Chemistry, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil, 626126, Tamilnadu, India

9921126003@klu.ac.in

Water-soluble polymers have been shown to interact with surfactant species to varying degrees, depending on the properties of the polymers and surfactants. Surfactants and waterSoluble polymers have very broad ranges of Applications. PEG 400 a water-soluble polymer. As a surfactant, it need to have hydrophilic and hydrophobic group. The Polyethylene glycol 400 (PEG 400), the polymer used in our study, is the most commonly used polymer in drug formulations. Anionic surfactants interact with neutral polymer more readily than cationic surfactant. Sodium dodecyl sulfate+ Polyethylene glycol 400 + Water, Cetyltrimethylammonium bromide + polyethylene glycol 400 + water, Hexamethylenetetramine + Polyethylene glycol 400 + Water were determined. The result finding may give information to optimize the suitable ternary mixture for the formulation of emulsions, detergents and other surfactant based products. The combined occurrence of polymers and surfactants is found in such diverse products as cosmetics,paints, detergents, foods, polymer synthetics and formulations of drugs and pesticides.

PP-122

Design and synthesis of cu-based multi-metal electrocatalysts for efficient CO_2 reduction technology

M. Issathul Riswan, K. K. Praneeth

Department of Chemistry, School of Advanced Sciences Kalasalingam Academy of Research and Education, KrishnanKoil-626126, Tamil Nadu,India.

e-mail:praneeth@klu.ac.in

The extensive consumption of fossil fuels has caused the rapid increase in the CO_2 level in the atmosphere, forcing people to find a clean and efficient technology of CO_2 conversion to alleviate CO_2 emissions and develop value added products. Among various CO_2 conversion systems, electro reduction of CO_2 to value-added chemicals is a feasible way for practical applications. Copper, the only metal that can catalyse CO_2 reduction to multi-carbon products, has attracted the most attention among various catalysts. However, slow reaction kinetics, low product selectivity, as well as poor stability are the main drawbacks of single metallic Cu-based catalysts. Such issues can be addressed by introducing second metal in Cu-based catalysts. Here, we summarize the recent progress relating to the Cu-based bimetallic electro-catalysts for CO_2 reduction, and discuss the composition and structure effects on the activity and selectivity of electrochemical CO_2 reduction. Last, we outline the challenges and perspectives on electro-catalysts for this field. We expect that this review can provide new insights into the further development of Cu-based bimetallic electro-catalysts for CO_2 reduction.

PP-123

PMMA/Cellulose based biodegradable polymer composite films for packaging applications

*M. Lakshmiprabha, P. Sivaranjana**

School of Advance science, Department of Chemistry, Kalasalingam Academy of Research and Education

E-mail:p.sivaranjana@klu.ac.in

The cellulose is the most abundant biodegradable material available in nature. The cellulose finds much more applications in the field of material science, biomedical and electronics. The extraction of cellulose from various sources via various methods were explored by researchers. The major source of cellulose is plants. This work aims at extraction of cellulose from agro waste material, rice husk. A huge quantity of rice husk waste generated every year, which were usually disposed by burning it in open environment. The rice husk was collected and finely grinded, sieved to uniform size. Then the sieved rice husk was subjected delignification, followed by bleaching process. The bleached materials were hydrolysed to get the cellulose. The cellulose obtained was filtered and dried. Then it was characterised with FTIR to ensure the chemical composition, XRD to finds its crystallinity, SEM to explore its morphology, TGA to finds its thermal stability. The polymer PMMA (Poly methyl methacrylate) is acetone soluble and it is taken as the matrix. The cellulose extracted from rice husk was added to the matrix poly methyl methacrylate filler material. Due to the stronger PMMA-acetone is a good solvent for PMMA. Acetone containing tetraalkylammonium chloride is found to be an efficient solvent for cellulose. The addition of an amount of 10 mol% (based on acetone) of well-soluble salt triethyloctylammonium chloride (Et3 octn Cl) adjusts the solvent's properties (increases the polarity) to promote cellulose dissolution. There by it

serves as a better packaging material, with improved moisture resistance, cheap, affordable and biodegradable.

PP-124

Economic design of variables single sampling plan

G. S. Akshara[1], and S Sridevi[2]

Department of Mathematics, Kalasalingam Academy of Research and Education, Krishnankoil-626126 , Tamilnadu, India

The decision of acceptance or rejection of lots is usually taken by some sampling procedures called sampling plans. Acceptance sampling is a statistical method for product control in which a small fraction of lots are taken and selected lots are inspected to decide whether the lot should be accepted or not. One of the major areas of acceptance sampling is variable sampling plan. The main advantage of variable sampling plan is that it requires only small sample size comparing to attribute sampling plan to obtain the same OC curve. Another advantage is measurable value is more informative. Measurable value gives more accuracy to an item than classifying it as conforming or non-conforming. When a lot is rejected in variable sampling plan, the measurements provide information that may help to prevent rejected lots in future. Main advantage of acceptance sampling is economy. In the literature on the acceptance sampling economic design of sampling plan is quite important. It should be highlighted that economic aspect of designing the sampling plans will have some advantages. Many works were published related to economic design of sampling for attribute quality characteristics (see for example, Balamurali et al. (2015), Mc Williams et al. (2001), Usha and Balamurali (2019) and Kannan et al. (2021)). But studies on economic aspect of designing of variables are limited. In this paper, we propose a designing methodology of variables single sampling plan using an economic model. Illustrative examples are also provided for selecting the optimal

parameters of economic variables single sampling plan under known standard deviation case and the quality characteristics under investigation has single specification limit.

PP-125

Designing of multiple deferred state repetitive group sampling plan for burr xii distribution

M. Muthumeena and S. Balamurali

Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education, Krishnankoil, 626126, Tamilnadu, India.

As a measure of quality control, acceptance sampling inspects a small number of available products in order to infer the quality of all other units produced. This is the sampling part, where a small number of units are randomly selected from the population of available units. If the sampled units are acceptable, then the whole batch is accepted. Acceptance sampling plans is mainly used in manufacturing industries for continuous improvement in quality standards. They are predominantly used in statistical quality control when complete inspection of the manufactured products is not possible for various reasons like the manufactured products being destructive in nature, inspection may be a time-consuming process. In this paper, designing of Multiple Deferred State Repetitive Group Sampling (MDSRGS) plan for assuring the quality of the products in terms of mean life when the product life time follows Burr XII distribution under truncated life test is investigated. In the field of statistical theory, the Burr XII distribution is widely used. Burr [1] demonstrated his life time distribution in 1942, over 75 years ago. Aslam et al. [2] based on the percentile life under the Burr type XII Distribution. To determine the plan parameters, two points on the operating characteristic curve approach is followed. Tables are constructed for various set of plan parameters and a fixed mean ratios under distribution. The proposed sampling plans are illustrated by

using a numerical example. Therefore, the proposed mean life MDSRGS plan compared with the existing median life MDSRGS plan by using the performance measure of the sampling plan under the Burr XII distribution.

PP-126

Binary Numbers in Image Processing: Representing, Manipulating, and Compressing Digital Images

P. Sivaraaj

Assistant Professor, Department of Forensic Science, Kalasalingam Academy of Research & Education (Deemed to-be University), Srivilliputhur, Tamilnadu.

Binary numbers play a crucial role in image processing, where images are represented as digital signals consisting of a series of numbers. In this context, binary numbers are used to represent the pixel values of an image, where each pixel is assigned, a unique binary code based on its intensity level. The binary representation of an image allows for efficient storage and processing of images using digital computers. Additionally, various image processing algorithms such as image compression, filtering, and segmentation rely heavily on binary arithmetic operations to manipulate pixel values. One common use of binary numbers in image processing is in thresholding, where an image is converted into a binary image by assigning each pixel a value of either 0 or 1 based on whether its intensity level is above or below a specified threshold value. This process is used to extract features from an image or to segment an image into regions of interest. Furthermore, binary numbers are used extensively in image compression techniques such as run-length encoding, which compresses sequences of binary numbers representing the image data. This enables efficient storage and transmission of digital images, which is critical in modern digital communication and multimedia applications. In summary, binary numbers are pure mathematical matrices which are essential in image processing as they

provide an efficient way to represent and manipulate image data using digital computers, enabling a wide range of image processing tasks and applications.

PP-127

Statistical Theorem's in Forensic Reasoning and Decision Making

M C Janaki

Associate Professor & Head, Department of Forensic Science, Kalasalingam Academy of Research & Education (Deemed to-be University), Krishnankoil, Sriviliputhur, Tamilnadu.

Forensic science involves the combination of logics for decision making, probability is one such technique used in mathematical theory for interpretation of logical calculus in decision making when data is uncertain, to define the formal concept of consistency the principle of deductive logic may be utilised to entertain the certainty of data and provide limitations to the understanding of deductive logic as a rule of interpretation. So, the law of probability infers a standard of reliability can be utilised for understanding of uncertain data under the forensic science. The main concept of probability is to measure the uncertainty and as a means of expressing preference through utility. Bayesian Paradigm describes probability based on prior knowledge of conditions that might be related to the event. Forensic doesn't apply the traditional Baye's theorem way of prior knowledge relevant to the event in analysis because the data analysed under forensic is evidence and the analysis should be unbiased and justiciable. Hence, the concept of Baye's under forensic involves the odds for or against an event or data, where the forensic law of progressive change is embraced in the calculation of probability of data available for analysis. As a development in understanding the Bayesian analysis SAILR a software package has been introduced for calculation of data, giving judiciary a greater confidence in their final decision. Thus, the current paper throws light on understanding

the mathematical probability theorem in the forensic perspective for analysis of evidence and to deliver justice.

PP-128

Solutions of Fuzzy Quadratic Riccati Differential Equation based on homotopy perturbation method (HPM) using Trapezoidal fuzzy number

Dharmalingam M[1], G.S. Mahapatra[2], S.Narayanamoorthi[3], Kameswari M[4]

[1, 4] Department of Mathematics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil, Srivillputhur, India.

[2]Department of Mathematics, National Institute of Technology, Pudhucherry, Karaikal, India.

[3]Department of Mathematics, Bharathiar University, Coimbatore, India.

The Riccati equation is a well-known mathematical physics equation. The second order linear differential equations are closely related to the ordinary Riccati equations. In this paper, the homotopy perturbation method (HPM) is used to solve the fuzzy quadratic Riccati differential equation. Three cases have been considered in the fuzzy quadratic Riccati differential equation. Only the initial condition is fuzzy in Case A; the coefficients are fuzzy in Case B; and both the initial condition and the coefficients are fuzzy in Case C.

PP-129

Local Structure Analysis of Mn-doped Zn_2SiO_4

T. K. Thirumalaisamy[1*], P. Diana[2], S. Saravanakumar[2]

[1] Department of Physics, HKRH College, Uthamapalayam – 625533, Tamil Nadu, India.

[2]Department of Physics, School of Advanced Sciences, Kalasalingam Academy of Research and Education (Deemed to be University), Krishnankoil, Srivillputhur, India.

In this work, phase pure Mn-doped Zn_2SiO_4 has been synthesized via a hydrothermal route. The crystallinity of synthesized material is analysed by powder X-ray diffraction pattern, which reveals the rhombohedral crystal system. Rietveld refinement technique was used for extracting the structural information. The electron density distribution analysis of Mn-doped Zn_2SiO_4 was carried out using the maximum entropy method (MEM) computation to examine the internal bonding nature of the material. Three-dimensional, two-dimensional and one-dimensional electron density distributions of Mn-doped Zn_2SiO_4 elucidated for understanding the bonding behaviours of the material.

PP-130

Adsorption and orientation Studies of 7-methyl coumarin adsorbed on silver surface: A DFT approach

S. Regurathi Pandian[1], R. Premkumar[2], Naidu Dhanpal Jayram[1]

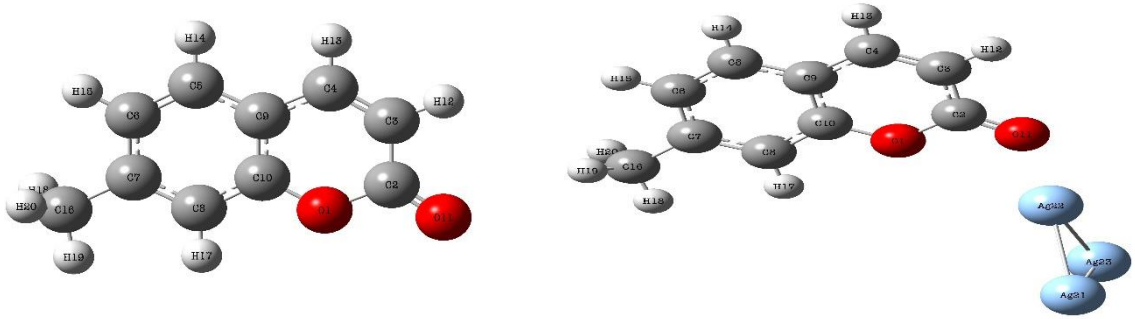
[1] *Plasmonic Research Laboratory, Department of Physics, Kalasalingam Academy of Research and Education, Krishnankovil-626126, India.*

[2] *Department of Physics (SF), N.M.S.S.V.N. College, Nagamalai, Madurai-625019, Tamil Nadu, India.*

The drug, medicinal product, toxin, and other natural or synthesised compound detection in the human body has become one of the most important fields of research in medicine, toxicology, and forensics. Raman studies using density functional theory (DFT) calculations have proven to be an effective tool for analysing the functional groups of drugs, tissues, biological fluids, bioactive molecules, and predicting the relationship between molecular structure and bioactivity of molecules. Significantly, as a result of the rapid development of nanotechnology and applications in forensic and biological sciences, the food industry, and art preservation, surface-enhanced Raman scattering (SERS) spectroscopy is becoming more popular as a technique capable of low detection limits in the analysis of small amounts of studied analyte molecules.

In the present study, the adsorption and orientation characteristics of 7-methyl coumarin (7MC) adsorbed on the Ag_3 metal cluster were investigated using surface-enhanced Raman scattering studies. Initially, the molecular structure of 7MC and 7MC- Ag_3 molecular systems were optimized and analyzed. The frontier molecular orbitals analysis confirms the charge transfer interaction between the

Ag_3 metal cluster and the 7MC molecule, which indicates the adsorption of the 7MC molecule on the Ag_3 metal cluster. The calculated energy gap value of the 7MC molecule was reduced after the inclusion of Ag_3, which validates the adsorption behavior of the title molecule on the Ag_3 metal cluster. The molecular electrostatic potential surface and Fukui functions analysis further validates the charge transfer between the Ag_3 metal cluster and 7MC molecule in the 7MC-Ag_3 system. Further, the absence of C═O stretching vibrational mode in the SERS spectrum confirms the flat-on orientation of the molecule on the metal cluster and the C-H in-plane bending vibrational modes are enhanced compared with its out-of-plane bending vibrational modes, which indicates the stand-on orientation of the molecule. Thus, the 7MC molecule adsorbed on the metal cluster through C═O functional group via tilted orientation. Thus, the present investigation leads to the understanding of the adsorption process of 7MC on the Ag_3 metal cluster, which will be useful for biomedical applications.



(a) (b)

Fig. 1 The optimized molecular structure of the (a) 7MC and (b) 7MC-Ag_3 molecular systems

PP-131

Geometric mean cordial labeling of splitting graph of a path graph P_n

Dr. K. Chitra Lakshmi [1], Dr. K. Nagarajan [2]

[1] *Department of Mathematics, V. V. Vanniaperumal College for Women, Virudhunagar – 626001, Tamil Nadu, India.*

[2] *P. G, Research Department of Mathematics, S. R. N. M College, Sattur – 626 001, Tamil Nadu, India.*

Let G = (V, E) be a graph and f be a mapping from V (G) → { 0, 1, 2 }. For each edge uv ∈ E (G), we assign the label $\left\lceil \sqrt{f(u)\, f(v)} \right\rceil$, f is called a geometric mean cordial labeling if $\left| v_f(i) - v_f(j) \right| \leq 1$ and $\left| e(i) - e_f(j) \right| \leq 1$ where v_f (x) and e_f (x) denote the number of vertices and edges labeled with x, x ∈ { 0, 1, 2 } respectively. A graph with a geometric mean cordial labeling is called geometric mean cordial graph. In this paper, Geometric Mean Cordial Labeling of Splitting graph of a Path graph P_n is discussed.

PP-132

Identification of super-spreader nodes in drug network by heatmap centrality for drug repositioning

Ilakkia Bharathi B, Induja M.C., Karishmaa Satishkumar, K.B. Krithiukha, R. Sundareswaran , M. Shanmugapriya

[1] *Department of Mathematics, SSN College of Engineering, Chennai, India.*

An important aspect of the study and analysis of real-world networks is the identification of potential super-spreader nodes within the network. In network analysis, centrality measurements play a crucial role in recognizing significant nodes within a network from structural perspectives. In this study, we used four main centrality measures (heatmap, degree, closeness, and betweenness) to analyze the drug network, where drugs are related to each other based on the similarities of their side effects. In order to determine prominent nodes within the network, the "shortest path" between two nodes is used to define the properties of the heatmap centrality by comparing the farness between a node and the average sum of the farness between its neighbours. The findings imply that drug centralities in the network may significantly impact drug repositioning, the process of identifying new therapeutic applications for already-approved medications. The drugs that have been approved to treat a specific condition were ranked by their centralities. The current study provides fresh perspectives on how to improve efforts at drug repositioning while highlighting the value of network centrality measures in directing systematic analysis for a beneficial network application.

PP-133

Neutrosophic soft matrices and its application in diagnosis of diseases and its control

Dr. P. Geetha, K. Karthika Devi and B.Karpagam

Department of Mathematics, V.V. Vanniaperumal College for Women, Virudhunagar 626001, India.

Neutrosophic set theory was introduced by Florentin Smarandache, which is used to deal the problems under uncertainty. Neutrosophic Soft Matrix Theory plays a vital role in decision making problem with imprecise and inconsistent data. In this paper, we define min-max product of neutrosophic soft matrices. Also we develop an algorithm using min-max product to diagnose the diseases and how to control it.

PP-134

Application of Graph theory in Scheduling Problems

A. Nadheera Parveen, A. Nandhinidevi

Department of Mathematics, V.V. Vanniaperumal College for Women, Virudhunagar 626001, India.

This paper focusses the application of tolerance graph and interval graph in scheduling classrooms during the Inter-Collegiate competitions and schedule of our college buses. A comparative study has been made using the chromatic number of both graph.

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