

VIBRATIONS

PHYSICS NEWS LETTER

(Edition June 2024 – Dec 2024)

Highlights of the
remarkable
achievements,
groundbreaking
research, and vibrant
association activities
of Physics department

Editors

Dr. G. Suresh Kumar

Dr. M. Venkatesh

Co-Editors

Dr. N.P. Subiramaniyam

Ms. B. Poonguzhali



The Department of Physics, established in 2003, focuses on providing quality education in Physical Science, equipping students to tackle scientific challenges. The department offers B.Sc., M.Sc., and Ph.D. programs in Physics. It has well-equipped laboratories that help students develop practical skills. Faculty members are engaged in advanced research areas such as nanoscience, nonlinear dynamics, molecular quantum mechanics, computational physics, optics, crystal growth, and biomaterials.

Vision

- To nurture the young minds with unique proficiency in Physics to meet the global challenges.

Mission

- To offer quality education in Physics by providing scientific inquiry and innovation.
- To kindle research interest by providing an excellent scientific ambience

Faculty Members



Dr. G. Suresh Kumar
Assistant Professor & Head



Dr. M. Venkatesh
Assistant Professor



Dr. N.P. Subiramaniam
Assistant Professor



Ms. B. Poonguzhali
Assistant Professor



Ms. G. Boomika
Assistant Professor



Mr. S. Surendhar
Assistant Professor

Inauguration of the Department Association Einstein's Hub & Astro Club

Date: 18.07.2024



The Department of Physics inaugurated its association, Einstein's Hub, and the Astro Club on 18th July 2024 at Dhenuka Hall. The Principal, Dr. V. Padmanabhan, presided over the event, felicitating the chief guest, Mr. T. Jayamurugan, President of the Tamil Nadu Science Forum (TNSF), Salem. In his keynote address, Mr. Jayamurugan emphasized the role of curiosity in scientific exploration and inspired students to actively pursue knowledge and innovation.

Dr. V. Padmanabhan, Principal, commended the department for its initiative and highlighted the potential of these platforms in fostering collaborative learning and research. He also announced the office bearers of Einstein's Hub and the Astro Club, recognizing the students' leadership roles in driving the activities of the association and club. The inauguration included an outline of upcoming activities such as workshops, guest lectures, sky observation sessions, and intercollegiate competitions aimed at enriching students' scientific and practical knowledge. The event concluded with an engaging interactive session, leaving attendees motivated and eager to explore the realms of physics and astronomy.

International Seminar on Artificial Intelligence and Internet of Things (IoT)

Date: 30.08.2023



The Department of Physics and Electronics and Communication jointly organized an International Seminar on Artificial Intelligence & IoT on 30.08.2024. Special thanks to our esteemed speakers, Dr. Haza Nuzly Bin Abdull Hamed from Universiti Teknologi Malaysia and Dr. K. Manikandan from PSG College of Arts & Science, Coimbatore, for their enlightening talks. Kudos to all participants for making this event a grand success!



CSIR sponsored National Workshop on IPR and IP Management for Startups

Date: 26.09.2024 & 27.09.2024



The Department of Physics and Chemistry jointly hosted a two-day CSIR-sponsored National Workshop on IPR for Startups on September 26-27, 2024, with over 200 students participating. Key speakers, including Dr. S.K. Balashanmugam, Mr. A. Raja, Dr. A. Pandikumar, and Mr. S. Udhaya Shanker, delivered sessions on patent regulations, IP strategies, and their relevance to startups and research. We thank CSIR for funding this impactful workshop.

Field visit to STEM Park, Erode

Date: 07.08.2024



We have organized an enriching field visit to STEM Park, Erode on 07.08.2024. Our students had the opportunity to explore cutting-edge scientific exhibits and engage in hands-on activities, fostering a deeper understanding and appreciation for the wonders of science and technology. The visit was a huge success, sparking curiosity and inspiring our budding physicists!

Field Visit to AICTE-Idea Lab, KSRCT

Date: 10.08.2024



We are excited to share that our student and faculty member had an enriching field visit to the AICTE-Idea Lab at KSRCT on 10.08.2024. We explored cutting-edge innovations and technologies, gaining valuable insights into the latest advancements in our field. A big thank you to the KSRCT team for their warm welcome and inspiring experience!

Career Guidance Programs Opportunities in the Software Industry

Date: 23.08.2024



The Departments of Physics and Chemistry jointly organized a Career Guidance Program on Opportunities in the Software Industry on 23rd August 2024 at the Smart Class. The session was led by Mr. Gopinath Madheswarn, Software Engineer at Activlleara, Erode, who shared valuable insights into the growing career prospects in the software industry.

This program provided a platform for students to explore interdisciplinary career paths, leaving them inspired and informed about opportunities in the tech sector.

Career Opportunities in Abroad

Date: 30.09.2024



The Department of Physics organized a Career guidance program “Career Opportunities Abroad” on 30th September 2024. The session featured speakers from Payana Solution, Erode, who provided valuable guidance on pursuing career opportunities overseas. The speakers discussed various aspects of building a global career, including higher education, job markets, visa processes, and skill development. They also shared practical tips and resources to help students navigate international opportunities effectively.

Alumni Meet 2023

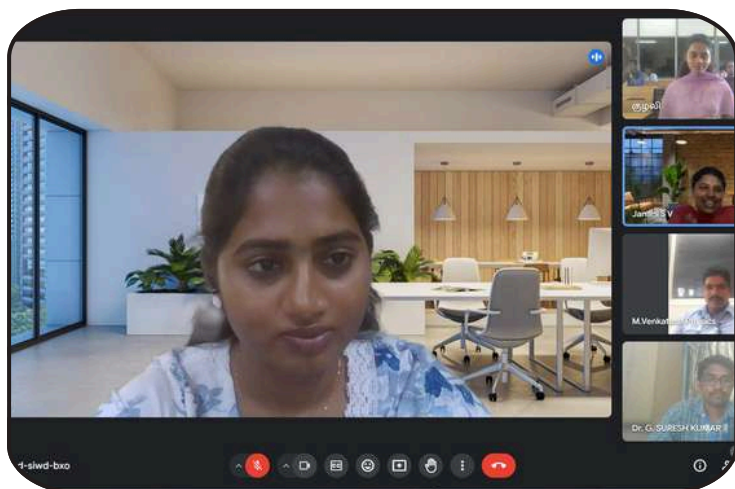
Date: 21.09.2024



on 21.09.2024, we welcomed back our alumni for an inspiring and memorable meet! With esteemed faculty and our cherished alumni gathered, it was a heartwarming event filled with nostalgia, knowledge-sharing, and exciting discussions about the future!

Alumni Connect

Date: 12.08.2024



We have organized Alumni Connect through online on 12th August 2024. The event featured inspiring sessions by our distinguished guest speakers: Ms. S.V. Janani, Software Engineer at Mphasis Limited, Chennai & Ms. M.A. Aarifa, Researcher at SRM Institute of Science and Technology, Chennai. Their insightful talks provided a wealth of knowledge and inspiration to our students and faculty members. We extend our heartfelt gratitude to the speakers for taking the time to share their experiences and insights with our students.

Science Awareness Program @ Shri Renga Vidyalaya School, Rayarpalayam

Date: 07.08.2024



On 16th November 2024, the Einstein's Hub and the Department of Physics conducted an inspiring Science Awareness Program at Shri Renga Vidyalaya School, Rayarpalayam. The event was filled with engaging activities, interactive demonstrations, and thought-provoking experiments designed to spark curiosity and foster a love for science among students.

Science Awareness Program @ Panchayat Union Primary School, Vadugapatty, Karur.

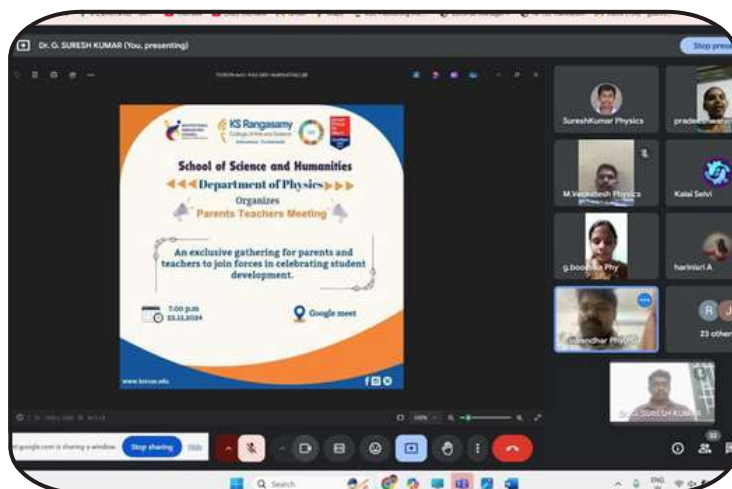
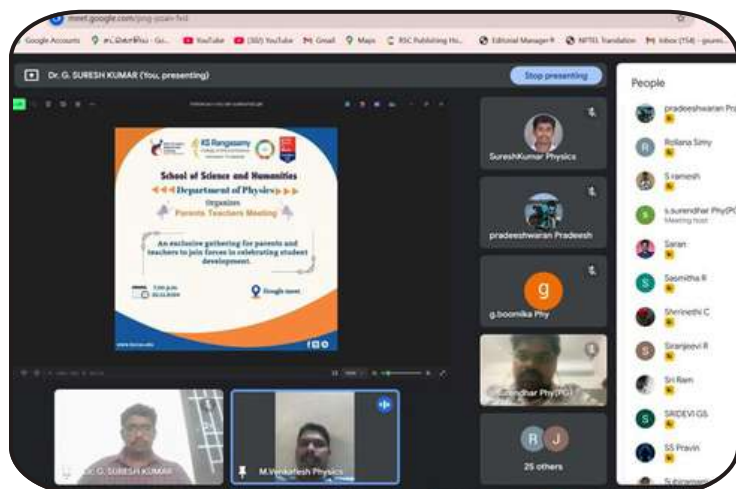
Date: 29.08.2024



The Department of Physics has organized a Science Awareness Program on 29.08.2024 at the Panchayat Union Primary School, Vadugapatty, Karur. The program aimed to ignite curiosity about science among young students and introduce them to fundamental concepts through engaging demonstrations and interactive sessions.

Parents Meeting

Date: 22.11.2024



The Department of Physics conducted a Parents-Teachers Meeting to strengthen collaboration for students' holistic development. Key discussions included students' academic performance, extracurricular activities, and strategies for overall development. Parents actively participated, providing valuable feedback and suggestions, making the session interactive and productive.

The meeting successfully fostered a strong partnership between parents and teachers, ensuring better support for students' progress.

Physics – Research Centre

The Department of Physics was accredited as a research centre in 2019 devoted to offering Ph.D. program in Physics. This Research Centre is dedicated to fostering a culture of academic excellence in research and innovation. Our research is focused on developing materials for energy, environmental and healthcare applications, aligning with our commitment to addressing pressing global challenges. Our faculty members actively engaged in collaboration with prestigious institutions worldwide, fostering a dynamic exchange of ideas and expertise. Welcome aspiring researchers! Join our Ph.D. program and be a part of our dynamic research community.

For more details Click <https://ksrcas.irins.org/faculty/index/Department+of+Physics>

Research Areas

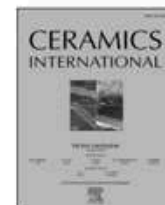
- Nanomaterials
- Biomaterials
- Nonlinear Dynamics
- Thin Films
- Energy Storage
- Photocatalyst
- Waste Utilization
- Corrosion Science
- Green Synthesis



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Ceramics International

journal homepage: www.elsevier.com/locate/ceramint



Microwave-assisted sol-gel synthesis of $MFe_2O_4@SiO_2$ ($M = Cu, Ni, Co$) ceramic nanostructures using rice husk as a sustainable precursor for electrochemical energy storage

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ARTICLE INFO

Handling Editor: Dr P. Vincenzini

Keywords:

Rice husk
Sol-gel
 SiO_2
 MFe_2O_4
Energy storage
Asymmetric supercapacitor device

ABSTRACT

In this study, we report the synthesis of $MFe_2O_4@SiO_2$ ($M = Cu, Ni, Co$) nanostructures by microwave-assisted sol-gel synthesis utilizing rice husk as a cost-effective silica precursor and polyethylene glycol (PEG) as a soft template. Structural and electrochemical properties were characterized using XRD, FTIR, FESEM, EDS, HRTEM, BET, and electrochemical techniques. The result revealed the formation of well-defined MFe_2O_4 spherical nanoparticles decorated mesoporous silica spheres. Electrochemical studies indicate that the $CoFe_2O_4@SiO_2$ electrode performs better than the $CuFe_2O_4@SiO_2$ and $NiFe_2O_4@SiO_2$ electrodes in faradaic redox processes and supercapacitor performance, having a specific capacitance of 1263 F/g at 1 A. Asymmetric supercapacitor (ASC) with $CoFe_2O_4@SiO_2$ as positive electrode exhibits high specific capacitance of 135.66 F/g at 1 A/g with good cycle stability retention (70.83 % at 10 A/g), high energy density (50.4 Wh/kg) and power density (891.522 W/kg). $CoFe_2O_4@SiO_2$ performs better than $CuFe_2O_4@SiO_2$ and $NiFe_2O_4@SiO_2$ because cobalt ferrite ($CoFe_2O_4$) has higher electrical conductivity, superior redox activity, and better electrochemical stability. This study offers cost-effective potential electrode materials for electrochemical energy storage, combining environmental sustainability with superior electrochemical performance.

We congratulate Dr. G. Suresh Kumar for his research article publication in “Ceramics International”, a Scopus- and WoS-indexed journal with an impact factor of 5.1. This achievement highlights his commitment to scientific excellence.





Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Journal of Alloys and Compounds

journal homepage: www.elsevier.com/locate/jalcom



Synergistic effect of α -alumina integrated silica ceramic nanocomposites prepared using waste beverage cans and rice husk for corrosion protection application

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ARTICLE INFO

Keywords:

Milling
Nanocomposites
Impedance
 Al_2O_3
 SiO_2
Waste utilization
Structural applications

ABSTRACT

In this study, we investigated the synergistic effect of α -alumina-integrated silica nanocomposites as a promising material for corrosion protection. We synthesized these nanocomposites in different proportions (90 wt% silica:10 wt% alumina (AS-1) and 70 wt% silica:30 wt% alumina (AS-2)) via ball milling using rice husk and waste beverage cans as the precursor source. XRD, FTIR and EDX analysis of α - Al_2O_3 integrated silica nanocomposites revealed distinct peaks corresponding to both silica and α - Al_2O_3 components, confirming the successful formation of the nanocomposites. FESEM and TEM analyses showed that the α -alumina and silica nanoparticles were agglomerated and inhomogeneous, with sizes ranging from 150 nm to 250 nm. Electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization tests showed that pure silica, AS-1, and AS-2 had corrosion rates of 1.7648, 0.4396, and 0.0610 mm/yr, respectively. AS-1 and AS-2 exhibited higher charge transfer resistance (R_{ct}) values of 34.54 K Ω and 48.60 K Ω , respectively, compared to pure silica (24.4 K Ω). Nyquist and Bode plots revealed the improved corrosion resistance of α -alumina-integrated silica nanocomposites compared to pristine silica-based protective coatings on mild steel. It is noted that the amount of α -alumina content enhances the corrosion resistance efficiency of the nanocomposites. The synergistic effect of the α -alumina-integrated silica nanocomposites can be attributed to the improved barrier properties and forming a protective layer on the metal substrate, effectively mitigating the corrosion process.

We congratulate Dr. G. Suresh Kumar for his collaborative research article publication in the Journal of Alloys and Compounds, a Scopus- and WoS-indexed journal with an impact factor of 5.8. This achievement highlights his commitment to scientific excellence.



Hydrothermal assisted synthesis of shape-controlled zinc oxide nanostructures for tuneable photodegradation of methylene blue pollutant

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Abstract

In this study, we have investigated the effects of EDTA, citric acid, and urea on the morphology-controlled synthesis of ZnO nanostructures by a hydrothermal method. XRD, FTIR, FESEM, TEM, BET, and UV-DRS studies revealed that the addition of different complexing agents not only controls the size and morphology but also alters the crystallinity, particle size, energy bandgap, specific surface area, and pore characteristics of ZnO. We achieved diverse morphologies, including spherical nanoparticles (80–100 nm), nanorods (1 µm length, 100 nm diameter), and nanoflakes (100–200 nm lateral dimension with 10–20 nm thickness) utilizing citric acid, urea, and EDTA as morphology controllers. The resulting nanoparticles had surface areas of 11.8 m²/g, 29.6 m²/g, and 4.6 m²/g, respectively. ZnO nanostructures developed with citric acid, urea, and EDTA were found to have a band gap of 3.273 eV, 3.209 eV, and 3.380 eV, respectively. The photodegradation efficiency of ZnO spherical nanoparticles, nanorods, and nanoflakes was found to be 90%, 97%, and 81%, respectively, demonstrating the shape-dependent photodegradation of MB dye. The prepared ZnO photocatalyst exhibits pseudo-first-order kinetics with good recyclability (five cycles) and stability. The enhanced photocatalytic performance of ZnO nanorods was attributed to their morphology, which facilitates efficient charge separation and increased surface area, leading to more active sites for pollutant degradation. This study offers a potential approach for developing morphology-driven photocatalysts for environmental remediation and water purification.

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We congratulate Dr. G. Suresh Kumar for his collaborative research article publication in the Journal of Sol-gel Science and technology, a Scopus- and WoS-indexed Q2 journal with an impact factor of 2.3. This achievement highlights his commitment to scientific excellence.



Students Achievements Highlights



6

Prizes in Sports/Conference

14

**participation in seminars/
conferences**

22

Participation in Workshop

5

**Papers presented in
seminars/conferences**

Faculty Achievements Highlights

- **Participation:** Faculty members are actively engaged in various seminars, conferences, FDP and workshops, contributing to professional development and knowledge sharing.
- **Papers Published:** Three research articles were published in international journals, showcasing their research contributions and advancements in their respective fields.
- **Dr. G. Suresh Kumar** serves as a reviewer for over 10 articles in various journals, contributing significantly to the peer-review process and ensuring the quality and integrity of published research in the field of materials science.



Dr. G. Suresh Kumar has received CSIR funding of ₹25,000/- to conduct a National Workshop on IPR and IP Management for Startups. Congratulations on this remarkable achievement!



Dr. M. Venkatesh has received TNSCST funding of ₹25,000 to conduct a National Workshop on Innovative Advancements in Space Applications and Empowering National Development through sky observation. Congratulations on this commendable achievement!



8

FDP attended

2

**Participation in seminars/
conferences/workshops**

1

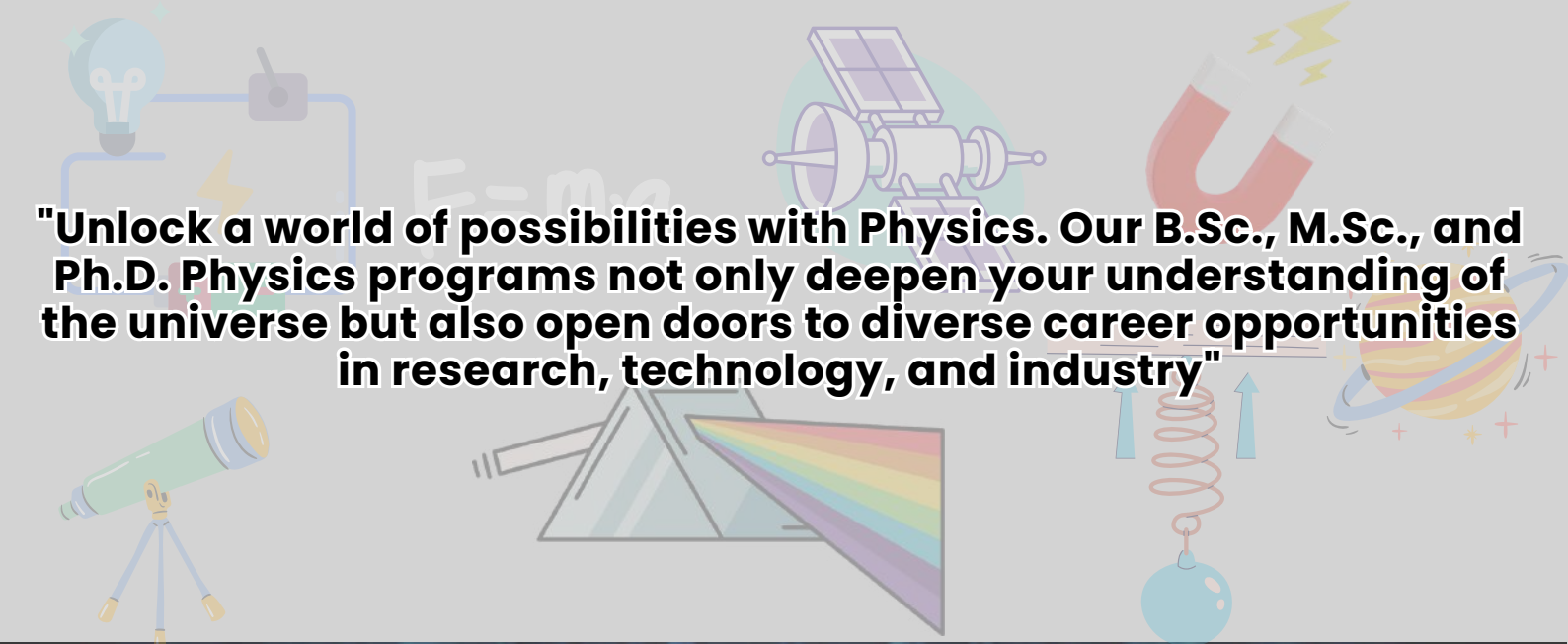
**NPTEL/Coursera course
Completed**

3

**Papers Published in
international Journals**

16

Proposal submitted



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