

CHEMISTRY NEWS LETTER

(Edition June 2024 – Dec 2024)

EDITOR- IN – CHIEF

Dr.V.PADMANABHAN
PRINCIPAL

**K.S.RANGASAMY COLLEGE OF ARTS AND
SCIENCE, THIRUCHENGODE**

ASSOCIATE EDITOR

Dr. R. P. SURESH JEYAKUMAR
HEAD – CHEMISTRY

BOARD OF EDITORS

DEPARTMENT FACULTY MEMBERS



The Department of Chemistry was Established in 2010 with Undergraduate course in Chemistry. Then it is been elevated as PG Department in 2012. The department has a well-equipped Instrumentation Lab for doing Lab Experiments and Research. The curriculum is designed focusing on developing the following skills in our students Employability Skills, Entrepreneurial Skills and Analytical Skills.

Vision

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

Mission

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

Faculty Members



Dr. R. P. Suresh Jeyakumar
Assistant Professor & Head



Dr. A. Rathinavelu
Assistant Professor



Dr. V. T. Priya
Assistant Professor



Mr. S Vijayakumar
Assistant Professor



Ms. S. Ruba
Assistant Professor



Mr. B. Karthi
Assistant Professor



Ms. G. Nikhitha
Assistant Professor

Inauguration of the Department Association and Club

Date: 18.07.2024

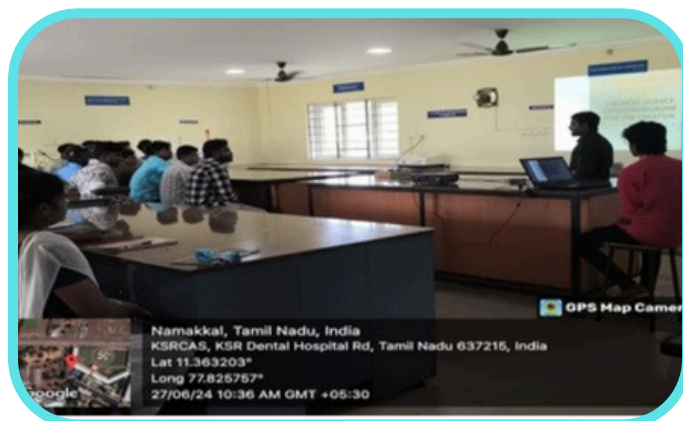


This program was conducted by the school of science and humanities (Dept. of Chemistry, Dept. of Mathematics, Dept. of Electronics & Communication and Dept. of Physics) on 18.07.2024. The chief guest of the programme was Mr. T. Jayamurugan, President, Tamilnadu Science Forum, Salem. The principal introduced the office bearers and association members. After the ceremony, all the associate members deliver their acknowledgement and took oath. Then chief guest gave his special address. He explained the role of science in the development of humanity and mentioned the scientist's invention history by his own interesting way. Students were inspired by his speech a lot.

Student Induction programme

Date: 26.07.2024

The Student Induction Programme was started with the aim of creating a thought about an entrepreneur on 26.06.2024, with the session "Chemical Science Entrepreneurship for Job Creation" in PG Chemistry Lab. The resource person Mr.M.Nishanth, Managing director, Lingam Aqua Industries, Salem, delivered his wonderful speech containing the basic requirements for an entrepreneur. He explained what are the difficulties faced in the field of water industries and how to solve those problems. He also gave the information about the current government rules and regulations in this field. He delivered some interesting business ideas based on chemical industries and also explains how to catch, stable and strengthen our business in the market.



In the afternoon session on 26.06.2024 Mr. M. Venkatachalam, Senior production officer, sanmar-chem plast, mattur conducted an enlightening session on "Scope of Chemistry in Industries" in AT 46. He led the programme with his wonderful speech containing the scope of chemistry in various institutions and the industries .Especially about the Pharma industries, dying industries, steel industries, rubber industries, fertilizer industries, paint industries and fabric industries. He also explained about advanced technic used in those industries. Definitely this program would give a different sight to the students about awareness on multiple job opportunities in chemical field.



Education is the most powerful weapon which you can use to change the world.



CSIR sponsored National Workshop on IPR and IP Management for Startups

Date: 26.09.2024 & 27.09.2024



திருச்செங்கோடு கே.எஸ்.ரங்கசாமி கலை மற்றும் அறிவியல் கல்லூரியில் தேசிய பயிற்சிப்பட்டறை



திருச்செங்கோடு செப் 28-
கே.எஸ்.ரங்கசாமி கலை
மையப் பற்றி உரையாற்றி
வந்து அறிவுசார் சொத்து
மையைப் பற்றி உரையாற்றி
அதன் முக்கியத்துவங்களையும்
விளக்கினார். குறு, சி
மக்கள் - செங்கோடு



Namakkal, TN, India
Tiruchengode, Namakkal, 637215, TN, India
Lat 11.357781, Long 77.830874
09/27/2024 04:03 PM GMT+05:30
Note : Captured by GPS Map Camera

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.

WORKSHOP

Startup and Entrepreneurship skills for Disposable Plastic Products Manufacturing

Date: 31. 08.2024



This program was conducted by department of chemistry in association with Institution's Innovation Council on 31.08.2024. The resource person Dr. M. Mubarak Ali, Assistant Professor, Chikkaiah Naicker College, Erode was started his wonderful speech containing the scope of chemistry in manufacturing industries. He also explained about advanced technic used in disposable plastic manufacturing industries. The highlight of the speech was about disposing methods, recycling techniques, reuse of plastics and their applications.



Visit to Erode Book Festival

Date: 13.08.2024



Department of Chemistry has organized field visit to Erode Book Festival with 3 Faculty Members on 13.08.2024. We were elated to attend the book fair. The purpose of the fair is to promote reading and enhance our knowledge Publishers from various genres have set up their stalls, offering a wide range of books catering to all interests. There were separate section for arts, science, fiction, adventure and other streams and teachers.

Field Visit to CEKRI, KARAIKUDI

Date: 26.09.2024



The UG and PG students of Chemistry Department visited Central Electrochemical Research Institute, Karaikudi. The visit aimed to provide students with practical exposure to cutting-edge electrochemical technologies and research activities. This enriching experience enhanced the student knowledge of real world research and motivated them to explore innovative solutions for current technological challenges.

Science Awareness Program @ Model School Sangakiri

Date: 27.08.2024



The "Drug Awareness for a Better future" was conducted on 27.08.2024 at Model School, Sangakiri and "Make Drug free Society and Awareness on Social Media" was conducted on 28.08.2024 at Government Boys higher secondary School, Tiruchengode as an extension activity organized by department of chemistry. The activity was conducted to final year B.Sc. chemistry students about the signs of Drug Awareness and prevention are crucial steps in reducing drug abuse and addiction. The drug abuse is growing concern worldwide, affecting individuals, families and communities. All the team members were executed their presentation through charts, PowerPoint presentation, and you tube Videos. All the school students listened to the presentation and understood very easily even they interacted with team members.

Science Awareness Program @Government Higher secondary school, Tiruchengode

Date: 28.08.2024



Alumni Meet 2024

Date: 21.09.2024



The Department of Chemistry, under the auspicious of the Socrates Society, hosted Alumniscence- 2024, a memorable gathering that brought together alumni to reconnect, celebrate, and reminisce. The event, which featured for both the UG and PG 2025 batches, was held on 21st September 2024 at 2:00 PM in the A Block at K.S. Rangasamy College of Arts and Science.

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. He 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.

National Education Day

Date: 11.11.2024



This program was conducted by department of chemistry in association with Institution's Innovation Council on 11.11.2024 at PG Chemistry Lab. the resource person Dr. G.Devagi, Assistant Professor, Department of Chemistry, J.K.K.Nataraja College of Arts and Science, Komarapalayam, was started her wonderful speech about how education is important in shaping the nation's future and promoting social responsibility. She also explained the instilling ethical and moral values of education.

Career Guidance Programs National Entrepreneurship Day Date: 09.11.2024



This program was conducted by department of chemistry in association with Institution's Innovation Council on 09.11.2024 at PG Chemistry Lab. The resource person Dr. D. Navaneethan, Assistant Professor, Department of Chemistry, J.K.K.Nataraja College of Arts and Science, Komarapalayam was started his wonderful speech about the most essential things that are needed to be a successful startup. He also explained about vision and mission of a startup, problem solving skills etc. Finally he gave some interesting business plans to the students. Definitely this program would give a different sight to the students about startup and entrepreneurship opportunities in chemical field.

K. Loganathan^{a,*}, R.P. Suresh Jeyakumar^b, Natarajan Arumugam^c,
Sinouvassane Djearameh^{d,e,*}, lingshing .wong^f, Saminathan Kayarohanam^g

^a Department of Chemistry, Vivekananda College of Arts and Sciences for Women (Autonomous) Elayampalayam, 637 205 Tamilnadu, India

^b Department of Chemistry, K.S.Rangasamy College of Arts and Science (Autonomous) Tiruchengode, 637211, Tamilnadu, India

^c Department of Chemistry, College of Science, King Saud University, P.O. Box 2455, Riyadh 11451, Saudi Arabia

^d Department of Allied Health Sciences, Faculty of Science, University Tunku Abdul Rahman, Jalan University, Bandar Barat, Kampar 31900, Malaysia

^e Biomedical Research Unit and Lab Animal Research Centre, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai 602 105, India

^f Faculty of Health and Life Sciences, INTI International University, Nilai 71800 Malaysia

^g Faculty of Bioeconomics and Health Sciences, University Geomatika Malaysia, Kuala Lumpur 54200, Malaysia

ARTICLE INFO

Keywords:

CeO₂ NPs

Ba / Er @ CeO₂ NPs

Co-precipitation method

SEM/EDX

ABSTRACT

Cerium oxide fine particles injected with metallic nanoparticles were produced using the co-precipitation method and characterized using various techniques such as XRD, SEM, FTIR, UV-Vis, and PL. Both injected and non-doped ceria nanoparticles exhibited a crystallographic structure similar to calcium fluoride. The nanoparticles ranged in size from 25 to 74 nm and had an inconsistent spherical shape. EDX analysis confirmed the presence of Erbium (Er) and Barium (Ba) in the ceria nanocrystal lattices. UV-Vis experiments showed that the optical band gap efficiency of purified CeO₂ NPs was 3.1 eV, while doped CeO₂ NPs had an energy level of 2.9 eV. The nanoparticles exhibited a sharp emission peak at approximately 347 nm. The synthesized CeO₂ NPs showed antibacterial activity against Gram-positive and Gram-negative bacteria, including *Bacillus subtilis*, *Staphylococcus aureus*, *Escherichia coli* and *Pseudomonas aeruginosa*. Overall, the results demonstrate that the doping of ceria nanoparticles with metallic nanoparticles can significantly enhance their antibacterial properties. This research paves the way for the development of novel antibacterial agents with potential applications in various fields such as medicine, food packaging, and water treatment.

1. Introduction

A large number of bacteria are present in our daily living environment, and the uncontrolled growth and spread of pathogenic bacteria can cause several human diseases and wound infections (Kumar et al., 2014). The discovery of penicillin has enabled humans to defend themselves against bacteria to some extent, and the extensive application of antibiotics has made a significant contribution to society. However, due to the heavy use of antibiotics, a high number of resistant bacteria strains have developed (Kumar et al., 2021), and the emergence of such drug-resistant bacteria has left traditional antibiotics inadequate in destroying them; hence, developing new antimicrobial agents to treat bacteria is urgently required. A promising alternative to combat

bacterial resistance comes from metal oxide nanoparticles (NPs). Metal oxide NPs have high chemical and biological activity due to different factors, mainly their small size and their high surface-to-volume ratio. As a result, they have been widely used in biology and medicine.

Genuinely, Cerium oxide (CeO₂) nanoparticles have emerged as an exciting emerging substance with potential applications in therapeutics and electroluminescent technologies (Pelletier et al., 2010; Alpaslan et al., 2017). Among the many applications of nanostructured CeO₂-based composites in ecological and energy technology includes outgas cleansing, fuel cells made of solid oxide, oxygen gases detectors, electrochromic components, ultraviolet (UV) protective coatings, and electrochromic devices (Farias et al., 2018). According to oxygen shortages in the crystal structure of either pristine or loaded ceria are

* Corresponding authors at: Department of Chemistry, Vivekananda College of Arts and Sciences for Women (Autonomous) Elayampalayam, 637 205 Tamilnadu, India (K. Loganathan). Department of Allied Health Sciences, Faculty of Science, University Tunku Abdul Rahman, Jalan University, Bandar Barat, Kampar 31900, Malaysia (S. Djearameh).

E-mail addresses: drkloganathan@vicas.org (K. Loganathan), sinouvassane@utar.edu.my (S. Djearameh).

<https://doi.org/10.1016/j.jksus.2024.103222>

Received 4 February 2024; Received in revised form 7 April 2024; Accepted 21 April 2024

Available online 23 April 2024

1018-3647/© 2024 The Author(s). Published by Elsevier B.V. on behalf of King Saud University. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

We congratulate Dr. R P.Suresh Jeyakumar for his collaborative research article publication in the Journal of King Saud University-Science. This achievement highlights his commitment to scientific excellence.





Enhanced Efficiency of Novel Green and Urea Mediated CuCo_2O_4 Nanocomposites for Acetaminophen Drug Loading, Accessible Catalytic Reduction of Nitro Compounds and Adsorption of Pesticides

J. Hemalatha¹ · I. Prabha¹ · R. Dhanush Kumar² · J. J Umashankar¹ · C. Senthamil¹ · K. Preethi¹ · S. Vijayakumar²

Received: 20 August 2024 / Accepted: 25 September 2024

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2024

Abstract

Researchers are focussing on creating sustainable environment by reducing the production and consumption of materials. The catalysis is not an exception, so there is always need for a catalyst that can perform multiple applications. Here, (*Carica Papaya*) and urea mediated CuCo_2O_4 nanocomposite was synthesized using simple co-precipitation method to perform drug loading, reduction of nitrocompounds and adsorption of pesticides. The prepared plant mediated CuCo_2O_4 (CCP) and urea mediated CuCo_2O_4 (CCU) was characterized using analytical techniques like XRD, UV-Vis, FT-IR, SEM-EDAX, TEM and DLS studies etc. The XRD patterns of CCP and CCU were indexed to the cubic spinal structure with the crystallite size of 11.9 and 27.6 nm by calculated using Scherrer's equation. The typical FT-IR spectra of CCP and CCU composites exhibited two extremely strong vibration peaks at the range of 658–657 and 540–545 cm^{-1} due to the presence of the Co-O and Cu-O bond vibrations respectively. The band gap values (E_g) were found to be 1.3 and 1.5 eV and thermal stability of the prepared CuCo_2O_4 was analyzed using thermogravimetric studies. The SEM images confirmed the spherical morphology with the particle size of 89.9 and 107 nm respectively. The catalytic efficiency was analyzed by using acetaminophen as a sample drug for finding the loading efficiency of CCP and CCU found to be linear with time of loading had good R^2 values of 0.93 and 0.91 respectively. The drug loading efficiency or entrapment efficiency of the CCP and CCU was found to be 72.8 and 85.2% after 48 h of drug loading respectively. The catalyst weight dependant activity of CCP and CCU in the reduction of 2-nitrophenol and 2-nitroaniline effectively witnessed the ability of CCP and CCU over other catalysts. Furthermore, CCP and CCU were used as the adsorbents and made to adsorb the real time agricultural pesticide like pendimethalin for a period of 130 min and the obtained cumulative data suggested the superiority of CCP over CCU in the above catalytic applications.

Keywords Photocatalyst · Drug loading · Pendimethalin · Reduction · Nitrocompounds

1 Introduction

Earth is the only planet with stable water bodies on its surface and the exploding population, industrial revolution at the beginning of 18th century put great stress on energy and

not managed to get clean water for their basic needs. Unfortunately, an extensive consumption and disposal of organic compounds end up in the water resources. Nitrocompounds and pesticides were the major mutagenic and carcinogenic class of organic pollutants that emerge from the textiles,

We congratulate Mr. G. VijayaKumar for his collaborative research article publication in the Journal of Inorganic and Organometallic materials. This achievement highlights his commitment to scientific excellence.

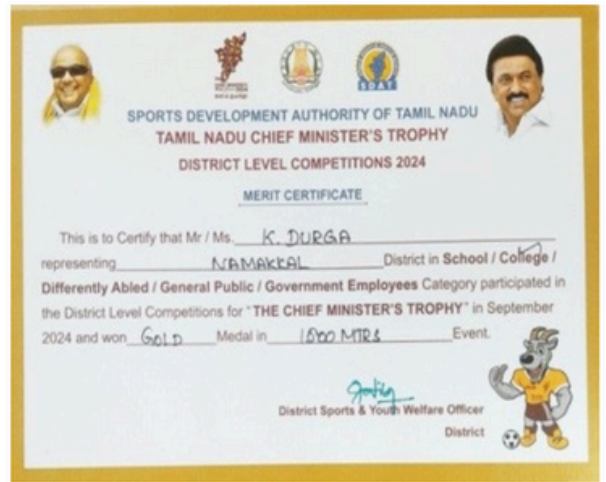


Internship And Placement



The Placement success reflects the dedication of both the students and the placement cell. Many students also secured internships and pre-placement offers from esteemed organizations. This achievement makes another feather on the cap of the department efforts.

Students Achievements Highlights



- 6** Prizes in Sports/Conference
- 15** participation in seminars/conferences
- 18** 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.

7

**Wadhvani Foundation
Course**

2

**Participation in seminars/
conferences/workshops**

2

**NPTEL/Coursera course
Completed**

2

**Papers Published in
international Journals**

