



03 June 2025 – DAY TWO, SESSION ONE

Topic: New Materials

**Speaker: Prof. T. Pawan Kumar, Principal
Scientist, Department of Chemistry
IMMT, Bhubaneswar**

TIME: 10:00 am – 11:30 am

VENUE: Seminar Hall, Madhusan Building, 4th Floor, CUTM

NO. OF PARTICIPANTS: 52

SPEAKER'S PROFILE:

Dr. T. Pawan Kumar is a Senior Scientist at the Department of R&D Planning and Business Development, CSIR-Institute of Minerals & Materials Technology, Bhubaneswar. After completing his B.Sc in Chemistry in 2002 (college first) and M.Sc in Organic Chemistry in 2004 from Osmania University (university first with four gold medals), he pursued his Ph.D research at CSIR-IICT, Hyderabad and was awarded his Ph.D from Osmania University in 2011. His professional journey includes working for Dolcera (an IP company), receiving the Inspire Faculty Award from DST, serving as Inspire Faculty & Assistant Professor at AcSIR, and a postdoctoral fellowship at NDSU, USA. He also worked briefly at NRDC, New Delhi, and was an Assistant Professor at TGASC, Puducherry. Dr. Kumar holds a PGDPL (Patents Law) from NALSAR and certifications from WIPO. His research areas cover Organic Chemistry, Asymmetric Synthesis, Process Chemistry, Medicinal Chemistry, Small Molecules Chemistry, and Green Chemistry. With around 18 patents, Dr. Kumar is a life member of several scientific societies and is currently focused on small molecule chemistry at the biology interface, process chemistry, and technology management.

OBJECTIVE:

- To introduce participants to the recent trends and advances in the field of new materials.
- To highlight the integration of organic chemistry and biological applications in developing novel materials.
- To discuss the importance of process chemistry and small molecule synthesis in industrial and pharmaceutical applications.
- To emphasize the role of intellectual property rights in safeguarding innovations in material research.

OUTCOME:

- Participants understood the scope of interdisciplinary research connecting chemistry, biology, and materials science.
- Enhanced awareness of the process of translating laboratory research into industry-ready materials.
- Gained knowledge about patenting processes and the strategic value of intellectual property in research.
- Motivated faculty and researchers to adopt collaborative and applied approaches in material science.

BRIEF REPORT:

The session on “New Materials” by Prof. T. Pawan Kumar, Principal Scientist at CSIR-IMMT, was an enlightening part of the FDP on “Role of Collaborative Learning in Integrated Science Education and Research.” Dr. Kumar shared his journey from academic research to applied science, demonstrating how small molecule chemistry, when integrated with biology, can result in innovative materials with broad applications.

He emphasized process chemistry and discussed several real-world examples where synthesis and scale-up processes were optimized for industrial production. His talk covered advanced topics in medicinal chemistry, asymmetric synthesis, and green chemistry, highlighting how these can contribute to sustainable material development.

An important part of the session focused on intellectual property rights. Dr. Kumar, drawing from his rich experience with patents, explained how researchers can protect and commercialize their scientific discoveries, adding value to academic research through technology transfer and business development.

The audience interacted enthusiastically, raising questions about synthesis techniques, patent filing strategies, and collaborations between institutions and industries. The session successfully bridged theoretical knowledge and practical applications, inspiring participants to pursue interdisciplinary and patent-oriented research in materials science.



03 June 2025 – DAY TWO, SESSION TWO

**Topic: Haemoglobin Metal Oxide Complex
using Gold Nano Cluster**

**Speaker: Dr. Sachitananda Rath, Associate
Professor, IIT Bhubaneswar**

TIME: 11:45 am – 1:15 pm

VENUE: Seminar Hall, Madhusan Building, 4th Floor, CUTM

NO. OF PARTICIPANTS: 51

SPEAKER'S PROFILE:

Dr. Sachitananda Rath is currently serving as an Associate Professor at IIT Bhubaneswar since 2022, after working as an Assistant Professor at the same institute from 2010 to 2022. He has a strong academic and research background in nanoscience and soft matter physics. Dr. Rath completed his Ph.D. in Physics from the Institute of Physics, Bhubaneswar in 2006. He gained significant international exposure through his roles as a Postdoctoral Fellow at Tohoku University, Sendai, Japan (2006–2007), JSPS Fellow at UEC, Tokyo, Japan (2007–2009), and as a Visiting Scientist at IGCAR, Kalpakkam, Tamil Nadu (2009–2010). Dr. Rath's research focuses on nanoclusters for molecular electronic applications, two-dimensional semiconductor nanostructures for solar cells, optoelectronics and sensors, rheological behavior of soft matter and nanomaterial dispersions, and ultrafast processes studied using femtosecond lasers. His work covers synthesis, characterization, and exploring applications of nanostructured materials in energy and device technologies.

OBJECTIVE:

- To introduce participants to the synthesis and application of haemoglobin metal oxide complexes using gold nanoclusters.
- To discuss the role of nanostructures in enhancing biochemical sensing and optoelectronic applications.
- To understand ultrafast processes and their significance in nanoscience.
- To highlight interdisciplinary research linking physics, chemistry, and biology through nanomaterials.

OUTCOME:

- Participants learned about the design and functionalization of gold nanoclusters for biological and electronic applications.
- Gained exposure to advanced techniques like femtosecond laser studies for characterizing ultrafast processes.
- Developed an understanding of how nanomaterials can improve sensing, solar energy conversion, and optoelectronic devices.
- Encouraged to pursue collaborative research in nanoscience combining experimental and theoretical methods.

BRIEF REPORT:

The second session on “Haemoglobin Metal Oxide Complex using Gold Nano Cluster” was delivered by Dr. Sachitananda Rath, Associate Professor at IIT Bhubaneswar. Dr. Rath shared his extensive research on the synthesis and characterization of gold nanoclusters and their unique role in forming complexes with biological molecules like haemoglobin, demonstrating the interdisciplinary bridge between nanoscience and biochemistry.

He elaborated on the controlled growth of nanostructures of various shapes and sizes and their characterization through techniques like light scattering and ultrafast spectroscopy using femtosecond lasers. Dr. Rath also discussed how such functional nanoclusters could be

utilized in advanced applications, including molecular electronics, optoelectronics, sensors, and solar cell technologies.

The session highlighted the importance of understanding rheological behavior in nanomaterial dispersions and nanofluids, especially under external fields, to tailor materials for specific applications. Participants showed keen interest in topics like ultrafast processes, the interaction between nanomaterials and biological systems, and potential industrial applications.

Overall, the talk provided a comprehensive perspective on cutting-edge research in nanoscience, encouraging participants to think beyond traditional disciplinary boundaries and explore the integration of physics, chemistry, and biology for innovative technological solutions.



04 June 2025-DAY ONE, 2nd SESSION

Technology & Sustainable Trends in Aluminium Industry

Dr B.K. Satpathy

Former Executive Director, NALCO

Director, Asia – ICSOBA (www.icsoba.org)

TIME: 11:45 am-1:15 pm

VENUE: Seminar Hall, Aryabhata Building, CUTM

NO. OF PARTICIPANTS: 42

SPEAKER'S PROFILE:

Dr B. K. Satpathy is a Ph.D. in Industrial Chemistry with MBA from premier institutions in India. He started his career as a Scientist in National Research Centre for few years after which he shifted to industry.

He then joined National Aluminium Company Limited (NALCO) Asia's largest integrated Aluminium complex where he was associated in commissioning of the Alumina Refinery and setting up the R&D Laboratory at the Refinery. Later he was the overall in charge of R&D activities of the company. He has worked in NALCO in various capacities until he has superannuated as Executive Director (Business Development & R&D). Currently he is working as a Visiting Faculty in IIT & CV Raman College of Engg., Bhubaneswar & He is member of several committees at National level.

He is a recipient of several awards at national and international level. To his credit he has 24 patents and over 46 publications in various national and international journals. He has over

30 years of research and technical experience in aluminium industry and some of his R&D out puts have been commercialized both in-house and to third parties.

OBJECTIVE:

- To explore technological advancements in bauxite mining, alumina refining, and aluminium smelting, including automation, digitization, and sustainable practices.
- To highlight the transformation of bauxite residue from an industrial waste into a valuable resource, supporting circular economy principles and environmental sustainability.
- To emphasize the aluminium industry's shift towards green technologies such as inert anodes, renewable energy, hydrogen fuel, and increased recycling to reduce carbon footprint and promote sustainability.

OUTCOMES:

- Participants gained knowledge on the end-to-end process of aluminium production, including the Bayer process for alumina refining and the Hall-Héroult process for smelting, along with associated inputs, outputs, and environmental impacts.
- The session promoted the understanding of sustainable trends and innovations in the aluminium industry, such as the use of inert anodes, renewable energy integration, automation, and advancements in residue management.
- Attendees were imparted with the knowledge regarding the role of aluminium in achieving sustainability goals, including reduced carbon footprint through recycling, circular economy practices, and energy-efficient technologies.

Brief Report:

The session “**Technology & Sustainable Trends in Aluminium Industry**” emphasizes

upon a comprehensive overview of technological advancements and sustainability efforts in the aluminium industry. It covers developments across the value chain, from bauxite mining and alumina refining to aluminium smelting and recycling. Following discussion on key Technological Developments, were made.

- **Bauxite Mining:** Emphasis on wet drilling, dust management, statistical modeling, and beneficiation techniques to upgrade low-grade ores and reduce reactive silica and iron content.
- **Alumina Refining (Bayer Process):** Adoption of tube digestion, double desilication, and advanced washing techniques (DCW, HRD) to improve efficiency and reduce waste.
- **Aluminium Smelting (Hall-Héroult Process):** Focus on reducing power consumption (<13,000 kWh), development of inert anodes, and transition to greener technologies including hydro, solar, and hydrogen-based energy.

3. Bauxite Residue Utilization

Efforts are underway to reclassify bauxite residue (red mud) from waste to a valuable resource. Successful applications include use in cement, iron extraction, and brick production, with pilot plants in operation.

4. Automation and Digitalization

The industry is leveraging Industry 4.0 principles such as IoT control, real-time monitoring, simulation, and energy management to improve operational efficiency and reduce manpower dependency.

5. Sustainability and Circular Economy

The aluminium sector has significantly reduced its carbon footprint over the past three decades. Key efforts include:

- Increased aluminium recycling, which uses 94% less energy than primary production.
- Lifecycle-based material reuse and substitution.
- Promotion of aluminium as a sustainable, 100% recyclable metal.

6. Future Outlook

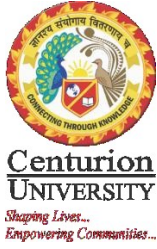
Emerging technologies such as selective alumina extraction, solar-powered refining, hydrogen-based reduction, and AI-driven automation are expected to drive the industry toward net-zero emissions. Challenges like high-silica bauxite remain, but ongoing R&D and policy support are helping to find sustainable solutions.

7. Conclusion

The aluminium industry is transitioning rapidly toward green technologies and sustainable practices. Collaboration, innovation, and continuous knowledge sharing across the global aluminium community are crucial for future progress.

Photographs of the Event:





04 June 2025-DAY Three, 1st SESSION

Statistical methods and tools

**Dr. Ambit Kumar Pany, Assistant Professor, Govt. Women's College,
Sambalpur**

TIME: 10:00 A.M.-11:30 A.M.

VENUE: Room no 419, Madhusudan Building, CUTM

NO. OF PARTICIPANTS: 40

SPEAKER'S PROFILE:

Basic Details

- **Name:** Dr. Ambit Kumar Pany
- **Position:** Assistant Professor, Department of Mathematics, Govt. Women's College, Sambalpur
- **Qualifications:** M.Sc. and Ph.D. in Mathematics
- **Contact:** ambit.pany@gmail.com | 86585 55634

Areas of Specialization

- Scientific Computing
- Numerical Analysis
- Computational Partial Differential Equations (PDEs)
- Finite Element Method (FEM)

Dr. Pany is a well-qualified faculty member with a firm research and teaching base in computational mathematics. His role is significant in training students in advanced numerical analysis and scientific computing techniques. In his research career he has published more than 20 SCI research articles and guided 3 doctoral students. Dr. Pany is actively engaged with research in numerical methods, often resulting in outputs such as journal articles, conference presentations, and the development of computational tools or software.

OBJECTIVE:

- To enhance the knowledge and skills of faculty members, researchers, and academic professionals in the application of statistical methods and tools for research.
- To provide a comprehensive understanding of both foundational and advanced statistical techniques, equip participants with practical exposure to statistical software, and enable them to apply these tools effectively in academic research, decision-making, and interdisciplinary studies.
- To enable participants to apply statistical techniques in their research and classroom instruction.

OUTCOMES:

- Participants gained a solid understanding of core statistical methods such as descriptive statistics, hypothesis testing, regression analysis, and multivariate techniques, enabling them to apply appropriate tools in academic research..
- The session promoted practical skills in using statistical tools such as Python (with pandas/statsmodels), or Excel, to analyze real-world data and interpret results accurately.
- Attendees engaged in discussions on python programming.

Brief Report:

A one-week Faculty Development Programme (FDP) on "Statistical Methods and Tools" was successfully conducted with the objective of equipping faculty members with a strong foundation in statistical techniques and data analysis. The programme aimed to bridge the gap between theoretical understanding and practical application of statistical tools in academic research and teaching.

The Faculty Development Programme (FDP) on "Statistical Methods and Tools" focused on enhancing the participants' understanding of core statistical concepts and their practical application in research and teaching. Key discussion areas included the fundamentals of data types, sampling methods, and descriptive statistics, followed by in-depth exploration of inferential techniques such as hypothesis testing, ANOVA, regression, and correlation analysis. Emphasis is also placed on the design of experiments (DoE), non-parametric methods, and the correct interpretation of statistical results. The FDP includes hands-on sessions using statistical software tools like Excel and Python, enabling participants to perform real-time data analysis and visualization.

Photographs of the Event:





05 June 2025 – DAY FOUR, SESSION FOUR

Topic: New Education Policy (NEP)

**Speaker: Prof. Dhruvananda Behera, Retired Professor,
Department of Physics and Astronomy, NIT Rourkela.**

TIME: 3:45 pm – 5:15 pm

VENUE: Seminar Hall, Madhusan Building, 4th Floor, CUTM

NO. OF PARTICIPANTS: 45

SPEAKER'S PROFILE:

Dr. Dhruvananda Behera served as Professor in the Department of Physics and Astronomy at NIT Rourkela, specializing in experimental condensed matter physics. Born on 10.03.1957, Prof. Behera holds an M.Sc., M.Phil., and Ph.D. in Physics. With over 100 publications in reputed national and international journals and participation in 61 conferences, his academic journey spans significant contributions to low-temperature condensed matter physics, high-Tc superconducting materials, and accelerator-based ion-matter interaction. He has supervised 4 Ph.D. scholars (3 focusing on ion irradiation in HTSC materials) and currently mentors 5 more students working on nanoferrites and heterostructures involving superconductors and ferromagnets. He has successfully completed four research projects funded by SERB, BRNS, and IUAC. Even after retirement, Prof. Behera continues to inspire young minds through active engagement in research and higher education discussions.

OBJECTIVE:

- To explain the vision, structure, and transformative aspects of the New Education Policy (NEP) 2020.
- To highlight NEP's focus on multidisciplinary learning, research, and skill integration.
- To discuss the policy's relevance to science education, especially in research-intensive domains like physics and materials science.
- To inspire faculty to adopt NEP principles for fostering innovation, critical thinking, and holistic development among students.

OUTCOME:

- Participants gained a clear understanding of NEP's focus on flexibility, student choice, and research-driven education.
- Recognized the potential of interdisciplinary programs and project-based learning encouraged by NEP.
- Understood the importance of integrating modern pedagogical tools and local context in curriculum design.
- Motivated to contribute towards institution-level implementation of NEP to enhance learning outcomes.

BRIEF REPORT:

The concluding session of Day-4 on “New Education Policy (NEP)” was delivered by Prof. Dhrubananda Behera, retired Professor from NIT Rourkela. Drawing on decades of teaching and research experience, Prof. Behera elaborated on the transformative vision of NEP 2020, which aims to revamp the Indian education system to be more holistic, multidisciplinary, and student-centric.

He emphasized that NEP encourages flexibility in subject choices, integration of vocational and skill-based courses, and an emphasis on critical thinking rather than rote learning. Prof. Behera also discussed how the NEP promotes a strong research culture, interdisciplinary collaboration, and innovation, which aligns closely with current trends in physics, nanoscience, and materials research.

Relating to his own work on nanoferrites, ion irradiation, and heterostructures, he illustrated how modern research themes fit naturally into the NEP's broader framework of experiential and inquiry-based learning. He highlighted the role faculty can play in mentoring students not only in technical skills but also in ethics, creativity, and social responsibility, which NEP envisions as essential components of holistic education.

The session concluded with an interactive discussion where participants explored practical strategies to implement NEP principles at Centurion University, including introducing interdisciplinary electives, strengthening project-based courses, and creating opportunities for research even at the undergraduate level. Prof. Behera's insights reinforced the relevance of NEP as a roadmap for nurturing globally competent, socially responsible, and research-oriented graduates.