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R&D Newsletter

Quarterly Newsletter of the Office of the Dean (R&D), IIT(ISM) Dhanbad

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About R&D Newsletter

The quarterly newsletter of the Office of the Dean (R&D), IIT(ISM) Dhanbad called "*R&D Newsletter*" is an in-house publication . The e-version of this newsletter is available on our official website at [www.https://people.iitism.ac.in/~research/](https://people.iitism.ac.in/~research/)

Dear Reader,

This issue of "*R&D Newsletter*" is to showcase our excellence in academic and research activities. With our ever expanding academic network and research base, we are able to show our strength as an Institute of National Importance.

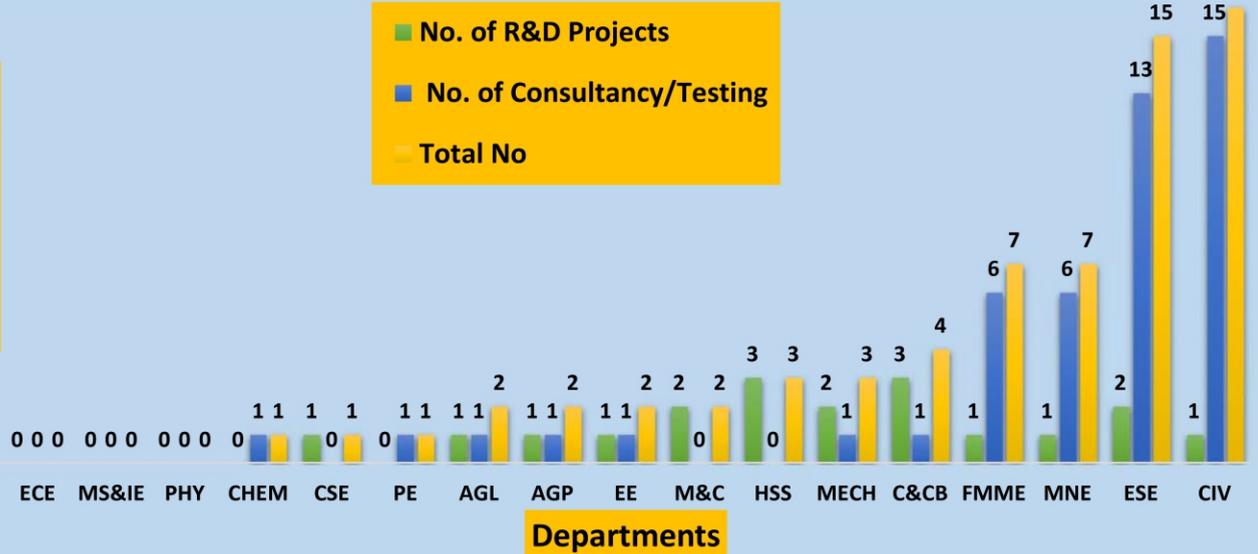


Dean (R&D)

R&D Funding of the Institute

No. of R&D Projects, Consultancy / Outreach Activities (Oct-Dec, 2025)

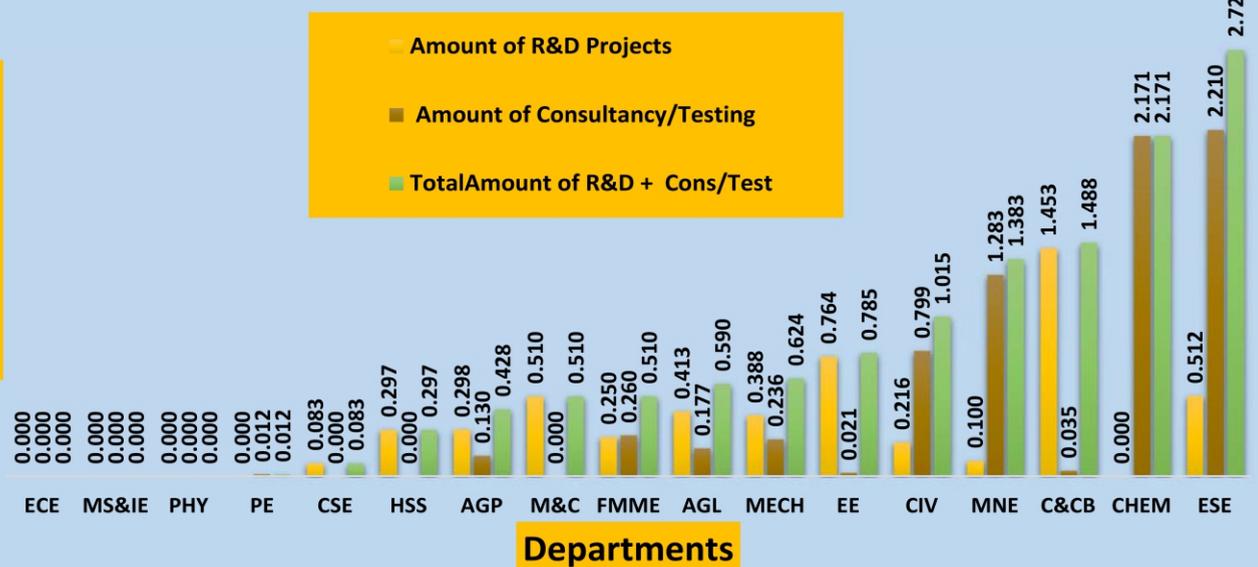
Number of Projects



Departments

Sanctioned Amount (In Crore) of R&D Projects, Consultancy/Outreach Activities (Oct-Dec, 2025)

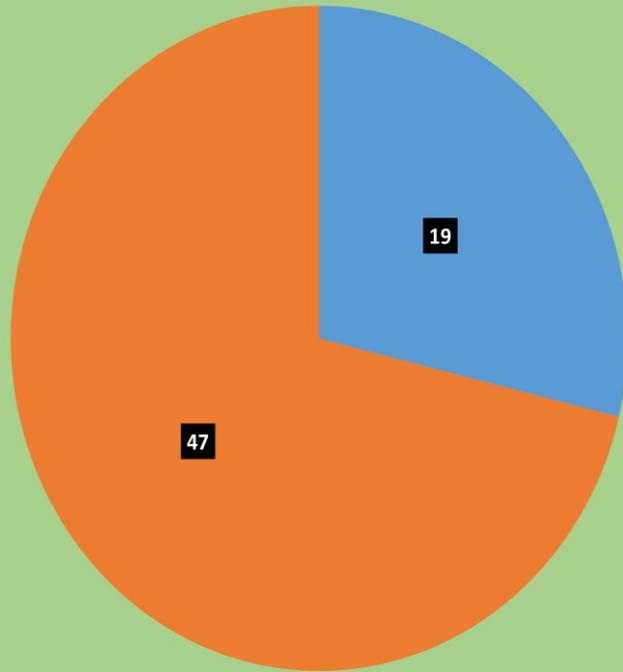
Sanctioned Amount



Departments

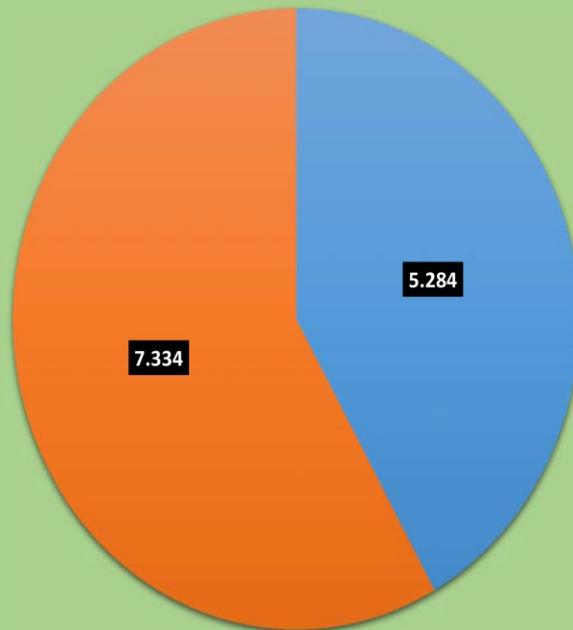
No. of R&D Projects, Consultancy/Outreach Activities (Oct-Dec, 2025)

- No. of R&D Projects
- No. of Consultancy/Testing



Sanctioned Amount (In Crore) of R&D Projects, Consultancy/Outreach Activities (Oct-Dec, 2025)

- Amount of R&D Projects
- Amount of Consultancy/Testing



Publications

Total No. of Publications : **329**

Selected Publications

- Chakraborty, **P.**, Sen, P., Peketi, A., Mishra, S., Chakraborty, P., Kumari, J., Bhaumik, A. K. & Hazra, B. (2026). "Environmental Geochemistry and Health," 48(2), 70.
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Book:

- Recent Advances in Shale Characterization Based on Laboratory Geochemistry and Geomechanics Techniques. Authored by: Chinmay Sethi, David A. Wood, **Bodhisatwa Hazra***, Mehdi Ostadhassan. Springer Nature Switzerland AG **2025**. (eBook ISBN: 978-3-032-03961-3; Published: 01 January **2026**)
- **Nitai Pal** Swati Lipsa, Ranjan Kumar Dash, Subhra Debdas, Korhan Cengiz, Pankaj Kumar and **Nitai Pal**, "Scientific Reports, Nature Portfolio", 15, 41241, **2025**.
- **Biplab Bhattacharyya** and S. K. Rajbhar, "Measurement: Energy", 8, 100077, **2025**.
- **Biplab Bhattacharyya**, S. K. Rajbhar, and S. Basak "Electric Power Systems Research," 253, 112520, **2025**
- Suraj, S., Narayan S. Manjarekar, **Soumyabrata Barik**, Sudarshan Swain, and Kumar Kashyap, "IEEE Access," **2025**.
- KP, Anagha Rajendran, **Soumyabrata Barik**, Sudarshan Swain, and Bikash Das, "e-Prime-Advances in Electrical Engineering, Electronics and Energy," 14, 101106, **2025**.
- Aarti Dahiya, Shalu Rani, Sanjay Kumar, and Themis Prodromakis, "Frontiers in Nanotechnology-Nanoelectronics," vol. 7, no. 1723433, pp. 1-15, **2025**,
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Patents

- Indian Patent No. 573950: Title: "Multi-model method and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy", No. 202431065336, Granted 18.11.2025. In the name of Indian Institute of Technology (Indian School of Mines), Dhanbad. Inventors: Anup Krishna Prasad, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Shailayee Mukherjee, Bitan Purkait, Atul Kumar Varma, Bhabesh Chandra Sarkar.
- Indian Patent No. 577115: Title: "A novel multi-model method of estimation of the gross calorific value (GCV) in coal using mid-infrared fourier transform infrared spectroscopy", No. **202531012376**, Granted 31/12/2025. In the name of Indian Institute of Technology (Indian School of Mines), Dhanbad. Inventors: Anup Krishna Prasad, Arya Vinod, Sameeksha Mishra, Bitan Purkait, Anubhav Shukla, Shailayee Mukherjee, Bhabesh Chandra Sarkar, Atul Kumar Varma..

Individual Faculty Achievements

- **Prof. M. K. Mukherjee** was invited to give a special lecture for Faculty Development Program in the “Department of Electrical Engineering, B. C. Roy College of Engineering, Durgapur on Nov 21, 2025, on “Emerging trends and Challenges in Renewable Energy”. Prof. Mukherjee delivered a talk on “*Geothermal energy- the geological controls and its implications on power generation*” that received a wide appreciation and applaud.
- Introduction of a new course “*Geoarchaeology*” by **Prof. D. K. Jha** of the Department of Applied Geology, IIT (ISM) Dhanbad attracted wide News Media coverage



- **Prof. A. K. Bhaumik** chaired a session with Dr. Rahul Mohan in session XII (Fossils as proxy in palaeoclimate and palaeoceanography, NK Panikkar Hall), in Palaeontological Society of India Platinum Jubilee Conference.
- **Prof. Ashutosh Tripathy** received “*International Travel Support from ANRF*” to attend “*Euroconf2026, Switzerland*”.
- Prof. Ashutosh Tripathy received an “*Early Career Researcher Grant*” from 'Euroconf 2026'.
- **Prof. B. Hazra** received the “*K. R. Gupta Gold Medal Award*” for the year 2025, from “The Geological Society of India”. The K. R. Gupta Gold Medal is given to a Scientist, below 40 years, for outstanding contributions in any branch of Earth Science. The paper entitled “*Experimental study on pore structure evolution of thermally treated shales: implications for CO2 storage in underground thermally treated shale horizons*” authored by **Prof. B. Hazra** has been

selected as one of the best 10 papers in the “*International Journal of Coal Science and Technology*”, for papers published between 2022-2024.



- **Prof. B. Hazra** received the “*JGSI Radhakrishna Prize 2025*” from “*The geological Society of India*” for the best paper published in JGSI.
- On the occasion of IIT(ISM) Foundation Day, observed on 9 December 2025 during its centenary (100) year celebrations, the Inder Mohan Thapar Research (IMTR) Award for 2023 in the Department of Applied Geology was conferred upon Dr. Suren Nayak, Assistant Professor at Utkal University, Bhubaneswar. This accolade recognized his outstanding PhD research work conducted in 2022, co-honoring his PhD supervisor, **Prof. Anup Krishna Prasad** of the Department of Applied Geology. The award was based on their publication: Nayak, S.; Vinod, A.; Prasad, A.K. *Spatial Characteristics and Temporal Trend of Urban Heat Island Effect over Major Cities in India Using Long-Term Space-Based MODIS Land Surface Temperature Observations (2000-2023)*. Applied Sciences 2023, 13, 13323.



- **Prof. A. S. Majumdar** and **Prof. P. Prusty** joined as Editorial Board Members of the Journal “*Scientific Reports*” (Springer Nature).
- **Prof. A. K. Bhaumik** presented his research work in the “*Palaeontological Society of India*”

Platinum Jubilee Conference” organised in NIO Goa during 29-31 October 2025. Paper title: “Documentation and extension of mid-depth MTD in the K-G basin: Benthic foraminiferal evidence” by Ajoy K. Bhaumik, Shiv Kumar, Sarmistha Chowdhury Under the theme Recent advancements in palaeontology and its applications.



- The team led by **Prof. Partha Pratim Mandal** emerged as winners of the *India AI Hackathon for Mineral Targeting-2025*, organized under the Applications Development Pillar of the IndiaAI Mission in collaboration with the **Geological Survey of India (GSI), Ministry of Mines**.



The hackathon focused on leveraging AI and machine learning to enhance mineral prognostication through integrated analysis of geological, geophysical, geochemical, and remote- sensing datasets. The team's winning solution, “CricSM AI: Critical and Strategic Mineral Mapping with AI” demonstrated a robust, data-driven framework for identifying prospective zones for critical and strategic minerals. The approach combined multidimensional datasets with advanced AI models to improve targeting accuracy and reduce exploration uncertainty. The team comprised **Prof. Partha Pratim Mandal**

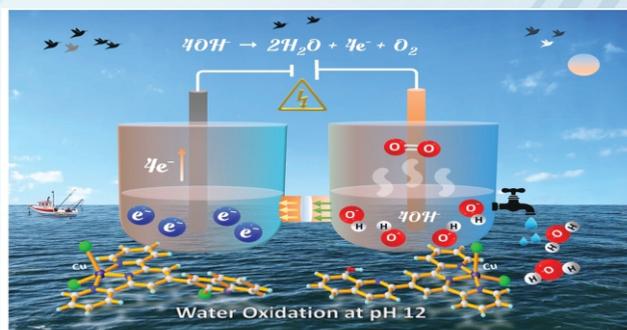
(Team Lead), Dinesh Munda, Litan Dutta, Tanmay Singh, Sai Satyam Jena, and Dr. Pradeep Kumar Shukla. Their innovation was recognized for its scientific rigor, operational relevance, and potential to support national mineral security and sustainable exploration initiatives.

- **IEI Young Engineers Award 2025 to Prof. Sourav Sengupta**. It is one of the most prestigious early-career recognition for engineers in India, that recognizes outstanding achievements /contributions made by young engineers (below the age of 35 years) in engineering research, excellence in engineering technology development, technology transfer, etc.
- **ISMAANA Ganesh & Pushpa Thakur Research Excellence Award** to Prof. Ejaz Ahmad. It is a research excellence award intended to recognize outstanding research performance by a faculty member at IIT (ISM) Dhanbad.
- **Prof. Sachin Tripathi** received the **Springer Nature Book Award (2025)** for contributions to scholarly publishing and research excellence
- **Prof. Prasanta K. Jana** was honored with the **Academic Excellence Award** at **RAAISA-2025** and recognized among the **Top 2% Indian Scientists in AI (Stanford Ranking 2020-2025)**.
- **Prof. Dharavath Ramesh** ranked in the **top 0.75% of researchers globally** in the **2025 Scholar GPS Rankings**.
- **Prof. P. K. Jana** received the **Long Service Award for 25 Years** of dedicated service to IIT (ISM) Dhanbad.
- **Prof. M. K. Singh** was awarded “*Change Maker Award-Academia*”, conferred by India Education Forum and India Employable Forum on 7th Nov. 2025 at Mumbai.
- **Prof. T. Ojha** was appointed as an Associate Editor of “*IEEE Transactions on Green Communication and Networks*”.
- **Dr. Satadru Das Adhikary** has joined as an Editorial Board Member of *Scientific Reports* (Nature Portfolio.)
- **Dr. Punyabeet Sarangi** delivered six lectures and led two hands-on training session at the Executive Development Programme (EDP) on “*Open Source GIS for Land Management in Coal Mining*”, organized by the Department of

Management Studies & Industrial Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, from 25–27 October 2025, for employees of Coal India subsidiaries. The training covered practical workflows in QGIS, data types and formats (raster vs vector), layer management and thematic mapping, open-source spatial data integration, land-use mapping, DEM processing, spatial/non-spatial data linking, etc.



Transactions” and highlighted as a Hot Article



Showing research from Professor Sumanta Kumar Padhi's laboratory, Department of Chemistry and Chemical Biology, IIT(ISM) Dhanbad, Jharkhand, INDIA.

Electrochemical water oxidation using single-site Cu(I) molecular complexes: a mechanism elucidated by computational studies

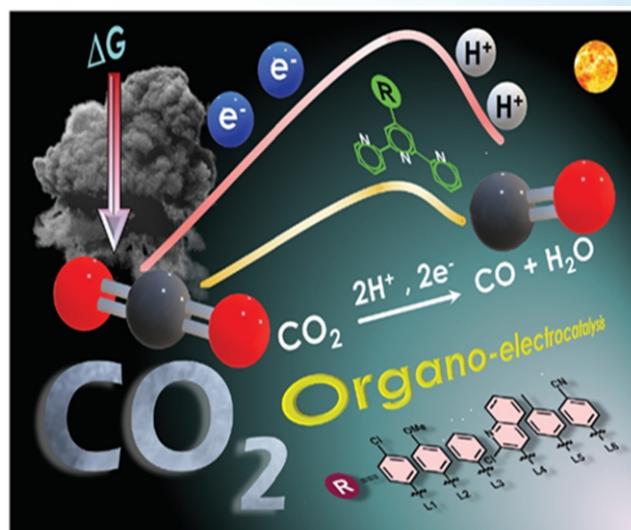
Two penta-coordinated Cu(I) complexes were investigated as electrocatalysts for water oxidation in phosphate buffer (pH 12): [Cu(OAc)(Tpy)Cl] (OAc-Tpy = 3-(2,2',6',2''-terpyridinyl-4'-yl)-2-thioureasulfonate) and [Cu(BHq)(Tpy)Cl] (BHq-Tpy = 2-(1,2,2',6',2''-terpyridinyl-4'-yl)quinolin-8-ol). Both follow a Water Nucleophilic Attack (WNA) pathway with first-order kinetics, where C-O bond formation is made possible by buffer-assisted proton transfer. $\log k_{\text{WNA}}$ values of 10.000 s⁻¹ and 15.000 s⁻¹ were found using Foot of the Wave Analysis. Tafel plots verified the latter's higher activity. According to theoretical research, WNA is supported, and oxygen evolution is more advantageous in alkaline environments because of hydroxide nucleophilicity.

Image reproduced by permission of Sumanta Kumar Padhi from *Dalton Trans.*, 2025, **54**, 13894.



rsc.li/dalton
Registered charity number: 207890

- Prof. Sumanta Kumar Padhi's work was featured on the Inside Back Cover of “Catalysis Science and Technology”



Showing research from Professor Sumanta Kumar Padhi's Artificial Photosynthesis Laboratory, Department of Chemistry and Chemical Biology, IIT(ISM) Dhanbad, Jharkhand, India.

Manoeuvring organo-electrocatalytic selective CO₂ reduction to CO by terpyridine derivatives: DFT mechanistic exploration

One sustainable method for producing clean fuel is the electrochemical reduction of CO₂. In a mixed DMF-H₂O media, this study introduces substituted terpyridine derivatives as effective organo-electrocatalysts for CO₂ conversion. Under modest overpotentials, these metal-free systems enable the selective conversion of CO₂ to CO by a 2H⁺/2e⁻ reduction process. While DFT studies show an EECC mechanism including coupled electrochemical and chemical stages, rational ligand choice improves catalytic efficiency. Molecular innovation driving sustainable CO₂ usage is reflected in the artwork.

Image reproduced by permission of Sumanta Kumar Padhi from *Catal. Sci. Technol.*, 2025, **15**, 7043.

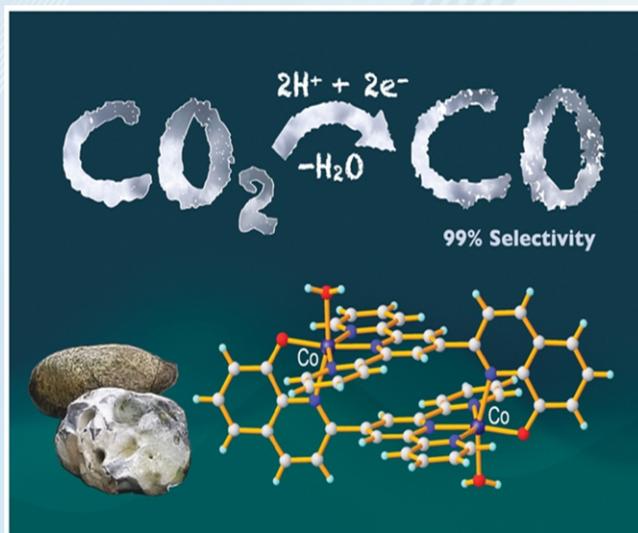


rsc.li/catalysis
Registered charity number: 207890

- Prof. D. P. Mishra, Professor, Department of Mining Engineering, IIT (ISM) Dhanbad, has brought distinction to the institute by winning two national awards at the **CMPDI Hackathons 2025** in the domains of Research & Development and Carbon Capture Technology. These notable achievements underscore Prof. Mishra's significant contributions to mine safety, sustainability, and carbon management, and further reinforce IIT (ISM) Dhanbad's leadership in innovative mining research and technological advancement.
- Prof. Ashok Kumar has been conferred with the **Inder Mohan Thapar Research (IMTR) Award** for the Year 2024 in recognition of his outstanding excellence in research publications during the calendar year 2025. This prestigious award acknowledges his significant scholarly contributions, high-impact research output and sustained commitment to advancing knowledge in his field. The recognition reflects Prof. Kumar's dedication to academic excellence and research leadership, and it brings distinction to the Department through his continued contributions to high-quality research and innovation
- Prof. Sumanta Kumar Padhi's work was featured on the Inside Back Cover of “Dalton

- Prof. Sumanta Kumar Padhi's work was featured on the Back Cover of “Dalton

Transactions" and highlighted as a **Hot Article**



Showcasing research from Professor Sumanta Kumar Padhi's Artificial Photosynthesis laboratory, Department of Chemistry and Chemical Biology, Indian Institute of Technology (Indian School of Mines) Dhanbad, Jharkhand, INDIA.

Selective electrochemical CO₂ reduction to CO by a Co(0) dimer catalyst by metal-ligand cooperativity

Electrochemical CO₂ reduction offers a promising route to mitigate greenhouse gas emissions. We report a cobalt dimer catalyst that selectively converts CO₂ to CO in DMF/H₂O (4.8 : 0.2 v/v) with 94 ± 2% Faradaic efficiency, 99% selectivity, and TOF_{cat} = 2575 s⁻¹ at a 760 mV overpotential. Mechanistic studies (DFT, IR-SEC, KIE) reveal ECEC and EEECC pathways involving stepwise proton-electron transfer and metal-ligand cooperativity. Reduction-induced ligand protonation enables CO₂ activation, providing mechanistic insights for designing advanced CO₂-to-CO molecular electrocatalysts.

Image reproduced by permission of Sumanta Kumar Padhi from Dalton Trans., 2025, 54, 16682.

As featured in:



See Sumanta Kumar Padhi et al., Dalton Trans., 2025, 54, 16682.



rsc.li/dalton
Registered charity number: 207890

- **Thillai Natarajan M** under the supervision of **Prof. Sumanta Kumar Padhi** was awarded the prestigious **JST-LOTUS** fellowship in collaboration with Prof. Hironobu Ozawa, Kyushu University, Japan.
- **Dev Raj** was awarded the **Best Poster** in the *Breakthroughs in Electrocatalytic Materials* category (sponsored by JEOL) at RAMSE-2025, IIT (ISM) Dhanbad.
- **Thillai Natarajan M** was awarded two Best Poster Awards in the categories of *Small Molecule Activation* (sponsored by **Dalton Transactions**) and *Environmental & Green Chemistry Materials* (sponsored by JEOL) at RAMSE-2025, IIT (ISM) Dhanbad.
- **Madhusmita Sahoo** was awarded the Best Poster in the *Sustainable Chemical Solutions* category (sponsored by TCI Chemicals) at RAMSE-2025, IIT (ISM) Dhanbad.
- **Palak Kumari Jaiswal, Thillai Natarajan M** and **Dev Raj** presented a poster at the

International Conference on Modern Trends in Inorganic Chemistry (**MTIC-2025**) at the University of Delhi during 18th-21st December 2025.

- Miss Neelanjana Ghosh, Research Scholar of **Prof. Biswajit Chowdhury** has been selected to receive the prestigious scholarship under the CII-ANRF Prime Minister's Fellowship for Doctoral Research scheme, as approved in the Apex Council Meeting held on 22nd November 2025
- **Prof. Antarip Poddar** has received the "**IGSTC Paired Early Career Fellowship in Applied Research (PECFAR) Call 2025**". As part of this prestigious Indo-German collaborative program, he will be representing IIT Dhanbad and partnering with Prof. Amirreza Aghakhani from the University of Stuttgart to pursue cutting-edge research in the field of intelligent microrobots for biomedical applications.



- **Prof. Antarip Poddar** (PI) and **Prof. Pawan Kumar Singh** (Co-PI) have received a project titled "*Development of Reservoir-on-a-Chip: an Electrically-Assisted Platform for Handling Polymeric Fluids in Enhanced Oil Recovery Applications*" of amount INR 89.25 lakhs under the ARG scheme of ANRF (DST).

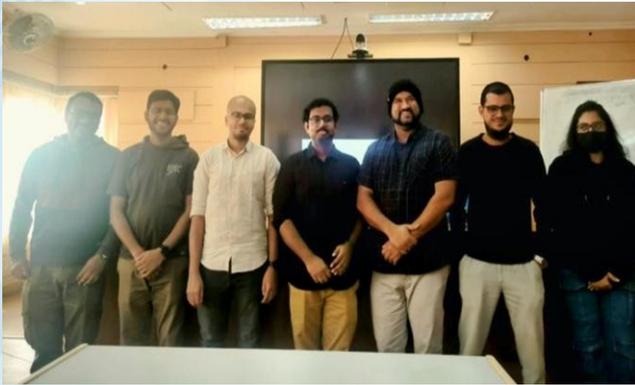


**Anusandhan
National
Research
Foundation**

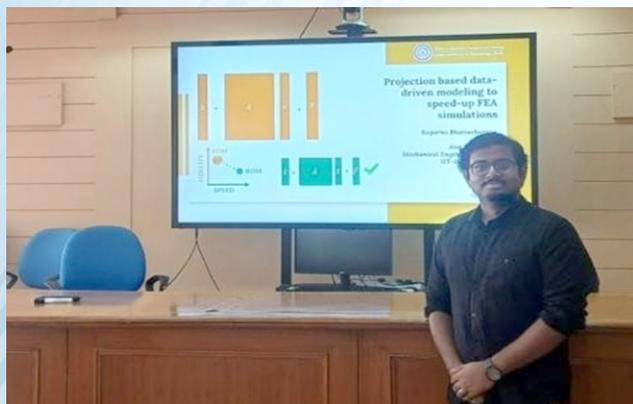
- **Prof. Suman Saha** delivered an invited talk on energy efficiency improvement in sustainable machining at the prestigious 13th International Conference on **Industrial Tribology (India Trib-2025)** held at IIT Bhilai during 14-16 Dec 2025]



- **Prof. Suparno Bhattacharyya** delivered an invited talk on “Projection-Based Data-Driven Modeling to Accelerate FEA Simulations” at the Center for Automotive Research and Tribology (CART) at IIT Delhi on November 10th.



- Prof. Suparno Bhattacharyya's paper titled “Model reduction of a flexible non smooth oscillator recovers its entire bifurcation structure”, was selected for an invited presentation at the prestigious *Recent Advances in Non-Smooth Dynamics (NSD2025)* conference, organized by European Mechanics Society, held from 8-10th December in Exeter, UK. The paper was presented by his advisor J. P. Cusumano.



Reduced Order Modeling of a Kicked Oscillator via Energy Closure Recovers its Bifurcation Structure

J. P. Cusumano¹ and S. Bhattacharyya²

¹Engineering Science & Mechanics, Penn State, University Park, Pennsylvania, USA

²Mechanical Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad, India

- **Prof. Ram Bilash Choudhary**, has been honoured with the Jharkhand Best Teacher Award by the *Indian Society for Technical Education (ISTE)*. The award was conferred at the Faculty Convention Centre, GGSESTC Bokaro, on October 31, 2025, in recognition of his outstanding academic performance and research contributions during the Monsoon and Winter semesters of the Academic Year 2024–2025.
- **Prof. Bobby Antony** has been awarded the Fellowship of the **Institute of Physics (FInstP)**, a well-deserved recognition of his outstanding contributions to the field of physics.
- **Dr. Sk Riyajuddin** has been appointed as an Editorial Board Member of Nature Scientific Reports. This recognition is a testament to his outstanding contributions to the field of Material Science and Nanotechnology and his dedication to advancing scientific research.

Major Research Output

- Reliable seismic imaging and the estimate of the distribution of subsurface stress depend on the accurate assessment of elastic anisotropy in shaly rock formation. Anisotropy is typically evaluated in the lab with contacting transducers. However, these measurements frequently reported significant uncertainty due to variations in mechanical coupling, limitations on the number of ray paths analyzed, and the relative sizes of transducers. We assessed the effectiveness of the contactless laser ultrasonic pulse transmission technique, which uses source and probing laser, and cylindrical rock sample placed on a rotating stage, to reduce uncertainties in the estimation of Thomsen's anisotropy parameters (TAPs). The ambiguity of propagation distance was eliminated from the smaller imprint of the source and receive laser on core sample, suggesting that group velocity is effectively estimated, and the observed wave attenuation is solely indicative of the rock. Three cylindrical samples of multilayer manufactured material, namely phenolic grade CE (Canvas Electrical), that were rather homogeneous and oriented differently (0°, 45°, 90° with respect to the bedding) were examined for P-wave velocity over approximately 630 separate ray pathways. The most precise estimation of TAP in a vertical transverse isotropic medium without knowledge of the symmetry axis has been achieved by using laser ultrasonic method on a Phenolic grade CE sample which is extracted horizontal to the bedding. Multiple dip angles, dense sampling, and multipath inversion of these data sets reduced Thomsen's delta parameter uncertainty by 20%. Application of the same technique on an anisotropic and heterogeneous shale sample suggests that (i) the mineralogy-controlled density heterogeneity observed from the 3D X-ray computed tomography images can be detected and identified from high-density laser ultrasonic data using reservoir monitoring techniques imported from field-scale geophysics, and (ii) TAP in the homogeneous and anisotropic sub-volume of the shale sample can be reliably estimated once heterogeneity is accounted for.
- The Department of Mining Engineering demonstrated significant research advancements across diverse domains of mining engineering, geotechnics, and allied technologies. Major outcomes included the application of advanced numerical modeling for optimizing mine dump design under dynamic loading conditions, contributing to improved slope stability and mine safety. The Department also made notable progress in geospatial and remote sensing applications through the comparative assessment of hybrid polarimetric decomposition techniques for enhanced land cover mapping. Cutting-edge integration of unmanned aerial vehicle (UAV) data with machine learning was employed to predict rock displacement velocity in jointed rock masses, highlighting the potential of data-driven approaches in rock mechanics. Furthermore, the development of metaheuristic-optimized machine learning models, particularly XGBoost, enabled accurate prediction of rock fragmentation, supporting efficient and sustainable mining operations. Complementary research outputs included comprehensive reviews on self-healing concrete for enhancing the durability of underground structures and optimization strategies for resource extraction coupled with slope stability in open-pit mining, collectively reinforcing the Department's commitment to innovation, sustainability, and technological excellence in mining research.
- The Department of Physics has received **three ANRF Advanced Research Grants**, highlighting its strength in **biophotonics, condensed matter physics, and quantum technologies**, with strong alignment to **interdisciplinary research** and **India's National Quantum Mission**.
 - **Prof. Umakanta Tripathy** — Principal Investigator
Title: Introducing a Novel Optical Device to Study Protein Aggregation in Real Time for Disease Diagnosis
Focus: Nonlinear optics-based real-time detection of protein aggregation for biomedical diagnostics.
 - **Prof. Umakanta Tripathy** – Co-Principal Investigator
Title: Tunable Fluorescent Organic Nanoparticles Based on a Single Benzene-Based Fluorophore for Enhanced Emission, White-Light Generation, and Bioimaging
Focus: Organic nanophotonics, fluorescence engineering, and bioimaging applications.
 - **Prof. Sudeshna Sen** – Principal Investigator
Title: Strong Correlation, Entanglement, and Complexity in Topological and Flat Band Systems: A GPU Accelerated Quest
Focus: Strongly correlated quantum systems, quantum entanglement, and GPU-accelerated high-performance computing.
 - **Prof. Sudipto Singha Roy** – Co-Principal Investigator
Title: Engineering Quantum Networks for Scalable Quantum Technology
Focus: Quantum networks, entanglement distribution, tensor-network methods, and noise-aware quantum architectures

Women Faculty Achievers

- **Prof. Madhulika Gupta** presented her research work titled “*Decoding the Role of Substitution Patterns and Surface Polarity in Biomass Recalcitrance*” at the International Conference on Hydrogen Energy and Sustainability (HES 2025), held at Indian Institute of Technology (BHU) from 10-12 October 2025. The work provided critical insights into structure–property relationships governing biomass deconstruction and sustainable energy applications.
- **Prof. Madhulika Gupta** was nominated under the Young Scientist category to attend the first IIT Women Faculty Meet held at Indian Institute of Technology Delhi on 15th November 2025, where she delivered a talk titled “*Strengthening the Role of ICCs and Promoting Women Leadership in IITs*”.



- **Prof. Madhulika Gupta** conducted a “*Gender Sensitization and Awareness Session on the POSH Act*” at SSLNT Mahila Mahavidyalaya on 1st December 2025, contributing to institutional awareness and capacity building on gender equity.



- The Indian Geotechnical Journal is bringing out a special issue titled “*Women in Geotechnical Engineering*”, scheduled for publication in

December issue, highlighting the outstanding contributions of women professionals across diverse domains of geotechnical engineering worldwide. **Prof. Sowmiya Chawla**, Associate Professor, Department of Civil Engineering, has been featured among the *top women geotechnical* professionals from across the globe, alongside several internationally acclaimed experts. The articles in this special issue collectively showcase technical excellence, research leadership, and lifetime achievements, reflecting the growing global impact of women in geotechnical engineering.

“My journey, beginning as a simple girl from southern India with a vision to make a difference, has been dedicated to advancing geotechnical engineering, geosynthetics, and ground improvement for sustainable transportation, especially railway geotechnics. I strive to bridge research and innovation with real-world applications that create meaningful impact. Looking ahead, I envision women as key contributors to innovation in railways and infrastructure, ensuring that their perspectives shape high-level decision-making and transformative policies. I believe that women’s active participation in high-level engineering and technological advancements will be crucial in shaping smarter, more sustainable, and future-ready infrastructure systems.”



- **Prof. Sowmiya Chawla**, Associate Professor, Department of Civil Engineering, participated in the 1st Geotech Asia 2025 Conference, a premier international event in geotechnical engineering jointly organized by ISSMGE, the Indian Geotechnical Society, and IIT Bombay, held from October 7–10, 2025. She chaired a technical session titled “*Soil Stabilization and Ground Improvement*”. The conference witnessed participation from over 600 delegates representing more than 40 countries, contributing to highly productive technical exchanges and collaborative opportunities.



- **Prof. Piyali Sengupta** had given a keynote lecture on Multi-hazard Fragility Assessment of Highway Bridges in the International Symposium on “*Urban Infrastructure & Natural Hazards: A Risk and*

Fragility Perspective” held at IIT Bombay on 28 November 2025.



➤ **Dr. Bandita Barman** delivered a keynote lecture at HYDRO 2025 titled *“Three-dimensional hydro-morphodynamic modelling of alluvial channels using TELEMAC and GAIA.”* The lecture focused on advanced three-dimensional numerical modelling of flow-sediment interactions in alluvial channels, highlighting methodological aspects, model capabilities, and practical applications in river engineering and morphodynamic studies.

In addition, she served as a Session Chair for the theme *“Coastal, Harbor, and Ocean Engineering”* facilitating technical sessions and fostering scholarly discussions among researchers and practitioners.

Dr. Barman also delivered an invited lecture at the Young Professionals Network (YPN) event during HYDRO 2025 on the theme *“Inspiring and Connecting Future Water Professionals”*, where she emphasized mentorship, interdisciplinary learning, emerging opportunities in the water sector, and the role of young professionals in addressing contemporary water-related challenge.



➤ **Dr. Jaishree Mayank** secured an **ANRF-ARG funded project (SANCHARI)** with a sanctioned budget of **₹1.72 crore**, focusing on unified platforms for time-sensitive networks. Her work

significantly contributes to reliable communication systems for smart infrastructure and mission-critical applications.

➤ **Prof. Swati Rajput** had the honour of serving as the Women in Engineering (WIE) Chair and Panellist at the IEEE International Conference on Electrical, Electronics and Computer Science with Advanced Power Technologies – A Future Trend (ICE2CPT 2025), held at NIT Jamshedpur from October 29–31, 2025

➤ **Prof. Shalini Gautam** has been recognised by Springer Nature India as one of the Top five women researchers and innovators in the institute and awarded for this achievement on 29th October 2025. Photos and awards are given below.



➤ **Prof. Shalini Gautam** has been invited to 16th edition of the flagship conference and expo Gasification India- 2025, scheduled on 27-28 November 2025 at Novotel, Juhu- Mumbai as a Guest Speaker during the technical session Innovation & Research Synergies for India's Gasification Future.



➤ **Prof. Aditi Sengupta** was recognized as part of Springer Nature India's *“Her Research, Our Future campaign”*, in collaboration with the Indian Council of Social Science Research (ICSSR), during the India Research Tour 2025 by the Ministry of Education, Government of India.



➤ **Prof. Sengupta and Prof. Ajay Bhandari** co-organized a six-day online FDP titled, “*Advances in Net Zero Energy Applications*” under the aegis of MMTTP between 3rd - 8th November 2025.

➤ **Prof. Sudeshna Sen**

• **Publication:**

1. A. Majumder, S. Sen, *Advanced Theory and Simulations*, **e01224 (2025)** – advancing theoretical modeling in complex quantum systems.

2. Zi-Jian Lang, Sudeshna Sen, Pak Ki Henry Tsang, Kristjan Haule, Vladimir Dobrosavljević, and Wei Ku, *Physical Review B* **112, 235158 (2025)**

• **Research Grant:** Awarded an **ANRF Advanced Research Grant** as Principal Investigator for her work on **strongly correlated systems, quantum entanglement, and high-performance computational approaches**.

• **Outreach:** Delivered a **popular science lecture** on **October 23** at Raman Hall, covering Classical and Quantum Mechanics, highlighting **Nobel Prize-winning research**, and emphasizing the **emerging importance of quantum technologies**. The interactive session engaged students and faculty alike, inspiring interest in modern physics.

➤ **Dr. Sampika Mallik**

• **Publication:**

S. Mallik, K. Terabe, T. Tsuruoka, *Advanced Functional Materials*, **e23757 (2025)** – focused on **functional materials and device-oriented physics**, contributing to advanced materials research

MoUs Signed:

- IIT (ISM) Dhanbad signed a Memorandum of Understanding (MoU) with the **Directorate of Geology and Mining (DGM)**, Government of Chhattisgarh. The event took place in the presence of the **Honorable Chief Minister of Chhattisgarh, Shri Vishnu Deo Sai**, during the prestigious “Mining Conclave 2025”, October 5, 2025. Prof. Shushanta Sarangi, Head of the Department of Applied Geology, represented IIT(ISM) Dhanbad and formally shared the MoU document with Shri Rajat Bansal (IAS), Director of DGM, Chhattisgarh. The MoU was spearheaded by **Prof. Anup K. Prasad** from the Department of Applied Geology, IIT(ISM) Dhanbad, in close coordination with officials from DGM, Chhattisgarh. This partnership aims to foster joint research especially in the field of exploration of critical minerals, leveraging IIT(ISM)'s expertise in applied geosciences. The signing occurred amidst Chief Minister of Chhattisgarh and other distinguished dignitaries, underscoring the significance of this collaboration for our shared vision to advance mineral exploration through cutting-edge technologies.



- On October 6, 2025, the Department of FMME signed a strategic MoU with **Anantagni Industries Private Ltd., Aurangabad**, to advance research in sustainable energy and the circular economy. Coordinated by **Prof. Rajasekhar Reddy Busigari**, the partnership focuses on developing scalable solutions for thermal conversion and waste valorization, leveraging the company's expertise in transforming waste streams into clean energy to foster eco-friendly industrial innovations.



Anshuman Agrawal, Managing Director, and Shri Harshit Agrawal, Head- Digital Transformation & Engineering, were present.

This collaboration aims to promote industry-oriented R&D, prototype development, student internships, and live industrial projects, while strengthening academia-industry engagement in advanced fluid power and maintenance technologies.



- IIT (ISM) Dhanbad has signed an MoU with **Minimac Systems Pvt. Ltd., Puneto** establish Minimac's Centre of Excellence in Fluid Testing and Analytics on campus. Funded by Minimac Systems, the Centre will be the first of its kind in Eastern India, focusing on fluid engineering, oil analytics, predictive maintenance, and intelligent maintenance systems.



The MoU was signed in the presence of senior leadership from both institutions, including Prof. Sukumar Mishra, Director, IIT (ISM) Dhanbad; Prof. Parthasarathi Das, Dean (R&D); **Prof. Somnath Chattopadhyaya, HoD, Mechanical Engineering; Prof. Ajit Kumar, Centre Coordinator; and Prof. Niranjana Kumar, Co-coordinator.** From Minimac Systems, **Shri**

International Visits in the Department:

- **Prof. Madhulika Gupta** presented her research entitled “*Deconstruction of Biomass for Bioenergy: Molecular Insights into Xylan-Cellulose Adhesion*”, in the international conference “AI and Materials for Sustainability (AIMS)” held in Abu Dhabi from 15-17 December 2025, highlighting molecular-level insights into biomass recalcitrance and their relevance for sustainable bioenergy applications.

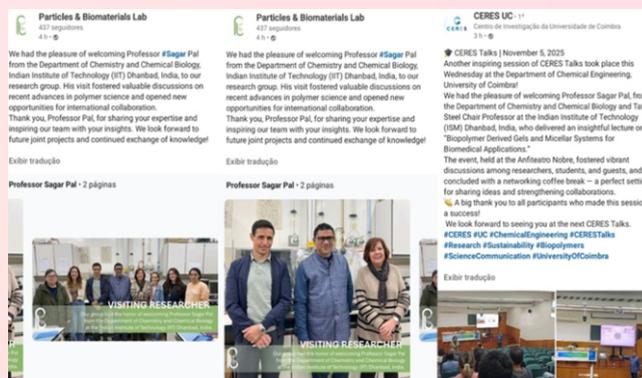


- PhD scholars Tripti Kundu and Ankit Joshi, under the supervision of **Prof. Madhulika Gupta**, also presented their research at the AIMS Conference. Tripti Kundu received the Best Oral Presentation award for her talk titled “*Conformational dynamics of O-2 acetylated xylan on cellulose surfaces: Implications for sustainable biofuel production*”, while Ankit Joshi presented a poster entitled “Impact of Dual Acetylation and Temperature on Xylan-Cellulose Interactions”.



- **Prof. Sushanta Mukhopadhyay** visited **TU Leoben, Austria (Oct 13-17, 2025)** to explore laboratory collaboration and international research linkages, including a diplomatic meeting with the Indian Ambassador to Austria.

- **Prof. Dharavath Ramesh** visited **Da Nang University, Vietnam**, initiating international collaborations in AI-based financial systems with researchers from South Korea and Vietnam.



- **Prof. Sagar Pal** visited University of Coimbra, Portugal as Erasmus+ Fellow during November 2025.

- **Title : International Collaborative Research with Institute of Protein Research (Osaka University, Japan Dr. Haswanth Vundavilli** undertook an international research visit to the Institute of Protein Research, Osaka University, Japan, from December 13th to 21st, 2025, as part of an ongoing international collaborative research initiative. This visit was fully funded by Osaka University, which awarded support for both travel and research execution in recognition of the scientific merit and collaborative potential of the proposed work. During his stay, Dr. Vundavilli was hosted in Dr. Kenji Mizuguchi's laboratory, where he actively engaged in advanced research activities focused on applying single-cell genomics approaches to investigate the molecular mechanisms underlying the progression of hepatocellular carcinoma (HCC). The collaborative work emphasized leveraging high-resolution cellular data to better understand tumor heterogeneity and disease evolution, laying the foundation for more precise diagnostic and therapeutic strategies.

- During his visit, Dr. Vundavilli delivered an invited talk titled “*Integrating Multi-Modal Data Using Machine Learning for Advancing Personalized Medicine.*” In this presentation, he explained in a clear and accessible manner how combining different types of biological and clinical data can significantly improve disease

understanding and support better clinical decision-making. He emphasized that relying on a single data type often provides an incomplete picture of complex diseases such as cancer, whereas integrating multiple data sources allows researchers and clinicians to capture disease heterogeneity more accurately and identify clinically meaningful patterns. In his talk, Dr. Vundavilli outlined two main research objectives. The first objective focused on developing a hybrid multi-omics machine learning framework that integrates RNA expression data, protein profiles, latent molecular factors, and clinical metadata to accurately classify different subtypes of hepatocellular carcinoma and identify reliable biomarkers that can guide personalized treatment strategies. The second objective is aimed at creating a multi-omics workflow combining tissue RNA, plasma RNA, and plasma proteomics data to discover and validate blood-based biomarkers for the early detection and monitoring of disease progression in MASLD-related hepatocellular carcinoma. By presenting these objectives, he highlighted the translational potential of his work in moving from complex data analysis toward practical, non-invasive tools for precision medicine.



International Collaborative Research with Institute of Protein Research (Osaka University, Japan)

• In addition to his research and seminar activities,

Dr. Vundavilli engaged in extensive interactions with faculty members and graduate students across the institute, fostering scientific discussions and exploring potential future collaborations. These interactions facilitated the exchange of ideas, methodologies, and perspectives across disciplines, further strengthening the international partnership between the institutions. Overall, the visit proved to be highly productive and impactful, contributing significantly to ongoing collaborative research efforts while opening new avenues for future joint projects in cancer genomics and personalized medicine.

- **Prof. Swati Rajput** attended the 2025 IEEE Photonics Conference (IPC) in Singapore, where she presented her research work titled *“Efficient All-Optical Modulation via ENZ-State Driven ITO Ring Resonator with Layered Bus Ring Integration.”*
- **Prof. Radhakanta Koner**, Associate Professor, Department of Mining Engineering along with two other delegates from IIT (ISM) Dhanbad visited TU Leoben, Austria, from October 13 to 17, 2025 as part of ongoing academic and research collaboration initiatives. During the visit, the team explored various laboratories and research facilities at TU Leoben, Austria and interacted with faculties and researchers to discuss potential areas of collaboration in the fields of mining, materials, and sustainable technologies.
- From October 22–29, 2025, **Prof. Rajendra Prasad Giri** and PhD scholar Ms. Suprita Paul visited the Indian Beamline at KEK, Japan, conducting advanced X-ray scattering studies on biomimetic cell surfaces with cholesterol and graphene nanoparticles.
- **Prof. Soumya Bagchi** was invited to deliver a talk at the ANPC 2025 conference held at iThemba Laboratory for Accelerator Based Sciences (iThemba LABS), Cape Town, South Africa.
- **Prof. Bobby Antony** participated in The Centennial of Quantum Theory: Progress in Atomic and Molecular Structure (CEQPAS) held during the first week of November 2025 at the Institute of Physics, Belgrade.
- **Prof. Gniewomir Sarbicki** from Nicolaus Copernicus University, Toruń, Poland, visited the department and delivered a talk on mixed state entanglement.

Workshop / Conference / Seminar

➤ Applied Geophysics Stall at IIT(ISM) Centenary Foundation Day:



As part of the 100th Foundation Day celebrations of Indian Institute of Technology (Indian School of Mines), Dhanbad, the Department of Applied Geophysics set up an engaging exhibition stall showcasing various geophysical instruments.



- **Prof. Madhulika Gupta** served as the convener for a one-day national workshop on STEM education titled “*STEMAarohan: Ascending New Heights in Innovation, Research & Education*”, organized under the National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA).



The workshop was held on 6 December 2025 at the Indian Institute of Technology (ISM) Dhanbad and focused on strengthening innovation-driven STEM pedagogy and research orientation among educators.

- **Prof. Sumanta Kumar Padhi** organised an International Symposium on “*Recent Advances on Materials for Sustainable Energy (RAMSE)-2025*” at the Department of Chemistry and Chemical Biology, IIT (ISM) Dhanbad on 13th December 2025.

The image displays a promotional poster for the IAHR Eastern India YPN Lecture Series. The poster features a portrait of Dr. Valentin Heller, an Associate Professor in Hydraulics, Environmental Fluid Mechanics and Geoprocesses Research Group at the University of Nottingham, UK. The lecture title is 'MODELLING AND PREDICTION OF SUBAERIAL LANDSLIDE-TSUNAMIS', scheduled for 29 October 2025 at 12:30 PM (IST) / 7:00 AM (GMT). A QR code is provided for registration. Below the poster is a screenshot of a Zoom meeting interface showing a grid of participants, including Dr. Heller, and a central video feed of the lecture content.

- **IAHR Easter India YPN Lecture Series:** The IAHR Eastern India Young Professionals Network (YPN), in association with the Department of Civil Engineering at IIT(ISM) Dhanbad, successfully hosted the second lecture in the IAHR EI YPN Lecture Series on October 29, 2025. The event was graced by Prof. S. K. Das, Dean(Faculty), who delivered opening remarks that set an inspiring tone for the session. Delivered online by **Dr. Valentin Heller**, Associate Professor in **Hydraulics at the University of Nottingham, UK**, the session focused on “*Modelling and Prediction of Subaerial Landslide- Tsunamis.*” Dr. Heller shared cutting-edge insights into the complex dynamics of landslide-generated waves, their modeling, and implications.
- The lecture attracted a diverse audience of students, researchers, and professionals, fostering engaging discussions on real-world applications and advanced simulation techniques. The virtual format of the lecture series ensured wide accessibility and active participation. The event underscored the department's commitment to promoting

knowledge exchange in hydraulic engineering and water resources research, further strengthening ties with global experts through the IAHR platform.

- Department of Civil Engineering, IIT (ISM) Dhanbad, organized a two-day workshop entitled "Advances in Application of High-Strength Reinforcement Bars in Construction of Concrete Structures" sponsored by TATA TISCON as a part of the institute's Centenary Celebration from 13.11.2025 (Thursday) to 14.11.2025 (Friday).



Prof. Pranesh Roy was the coordinator and **Prof. Rahul Bhartiya** was the co-coordinator of the workshop. A total of 36 participants attended the workshop. The workshop was for practicing engineers and architects who joined from various parts of the country. The lectures were delivered by distinguished professors and industry experts. Prof. Sarat Kumar Das, Professor (HAG), IIT (ISM) Dhanbad, delivered a lecture on "Concept of sustainability with M-sand from coal mine overburden as a construction materials: An overview".



Prof. Rajib Sarkar, Associate Professor, IIT (ISM) Dhanbad, explained "Earthquake Resistant Foundation Design". Prof. Sanket Nayak, Associate Professor, IIT (ISM) Dhanbad, discussed "Role of Steel towards Seismic Safety of RC Structures". Prof. Vishwas N. Khatri, Associate Professor, IIT (ISM) Dhanbad,

elucidated on "Subsurface Exploration For Shallow and Deep Foundations: Tests and Interpretations". Prof. Rahul Bhartiya, Assistant Professor, IIT (ISM) Dhanbad, delivered a lecture on "Failure of Structures – Case Studies". Prof. Pranesh Roy, Assistant Professor, IIT (ISM) Dhanbad, provided an overview of "Smart Civil Engineering Materials and Structures". Mr. Keerti Dev Singh, Sales Manager, Tiscon Retail, Tata Steel demonstrated an experiment on ring formation in thermo-mechanically treated steel rebar.



The workshop also included a visit to the concrete laboratory of the Civil Engineering Department, IIT (ISM) Dhanbad where non-destructive testing using a rebound hammer, Ultrasonic Pulse Velocity, and rebar locator was demonstrated.

- Centenary event: Hack 4 Sustain 2025



- The Department of Civil Engineering, IIT (ISM) Dhanbad, successfully organized HACK4SUSTAIN 2025 on 5th December 2025, marking its first-ever hackathon. The event, themed "Innovate, Build, Sustain: Propose breakthrough ideas that reimagine infrastructure to save energy, conserve resources, and build sustainably," aimed to provide a platform for students to develop innovative, sustainable, and resilient civil engineering solutions.
- A total of 104 students across 32 teams from IIT(ISM) Dhanbad, BIT Sindri, BIT Mesra, and NIT Jamshedpur participated, with 20 teams advancing to the final round. The hackathon was conducted in three phases, including idea pitching, prototype/ model demonstration, and final presentations with expert jury interaction. Participants addressed challenges in low-carbon materials, eco-friendly design, disaster-resilient systems, climate- adaptive infra structure, and

smart digital approaches.



After thorough evaluation, three teams were declared winners for their exceptional innovation, feasibility, and sustainability impact, while six teams received consolation prizes. All participants were awarded certificates. Additional interactive activities such as Civil Quiz, Brain-Bowl, Surveying with a Twist, and Material Mystery Box enhanced engagement and peer learning.



The event was successfully coordinated by the faculty and student organizing committees. HACK4SUSTAIN 2025 set a strong precedent for innovation-focused initiatives, and the Department looks forward to an even larger and more impactful HACK4SUSTAIN 2026.



➤ Centenary event: BUILD2025

- The Department of Civil Engineering organized an event entitled “Build2025” on 08.12.2025 which was a competition on “Building urban innovative load-resistant design of civil infrastructure” as a part of the centenary celebration of IIT(ISM) Dhanbad. It was sponsored by PVUN, KT MPL, MEGAPLAST, Aimil Ltd., and Krubber. The event was coordinated by organizing committee members, Prof. Piyali Sengupta, Prof. Pranesh Roy, Prof. Rahul Bhartiya, Prof. Leeza Malik, Prof. Avinash Kumar Singh, and Prof. Lijith KP. There were two sub-events, namely, Build-Mania and Exhibit-Craze. Build-Mania was a model building event. It is about building a balanced cantilever bridge using cardboard, glue, tape, and ice-cream sticks. The model building time onsite was 1.5 hours. Evaluation was based on model demonstration and strength to weight ratio. Exhibit-Craze was an exhibition event. Here, participants carried their built models from home. The models

included hydraulic dam, twin horse-shoe tunnel, battery operated smart transportation system and many more. Models were ready for exhibition and were demonstrated by the participants. Model dimension was limited to 0.5m x 0.5m x 0.5m. In both the events, team size was up to 3-5 students. Dr. Amiya, BCCL, Dr. Aditya Rana, CIMFR, Dr. Shorub Rukiya, CIMFR were the judges of the events. The prize money of Rs.15000, 10000, and 6000 was awarded to the winner, first, and second runner-up.



➤ Centenary event: POSTER PRESENTATION COMPETITION

- The Department of Civil Engineering organized a poster presentation competition as part of the centenary celebrations of IIT (ISM) Dhanbad on 06.12.2025. It was sponsored by PVUN, KTMPL, MEGAPLAST, Aimil Ltd., and Krubber. The event was coordinated by organizing committee members, Prof. Smruti Sourav Mohapatra and Prof. Punyabeet Sarangi. The event invited ongoing and unpublished research papers in the areas of geotechnical, structural, transportation, and water resources engineering in the form of an abstract of 300 to 400 words from PG and PhD student so four institute, as well as from outside participants. We received
- 32 abstracts, out of which we shortlisted 17 abstracts based on their technicality and originality. Shri Manoj Kumar Pandey, NHAH Hazaribagh; Shri Ashish Kumar, ECR Dhanbad Division; Shri Onkar Ashis, ECR Dhanbad Division; and Prof. Alok Sinha, HOD Department of Environmental Engineering were the judges of the events. During the evaluation of posters, each participant was given 10 minutes to explain their work to the judges, followed by 5 minutes of interaction session. The prize money of ₹15000, ₹10000, and ₹5000 was awarded to the winner, first, and second runner-up, followed by 5 consolation prizes of ₹1000 each. Mr. Shubham Kumar of IIT(ISM) (Geotechnical) was the winner, Mr. Shivam Shekhar of BIT Mesra (Structural) was the first runners-up and Mr. Nitish Kumar of IIT (ISM) (Water Resource) was the second runner-up.





- **Hackology 2025: From Phishing to IoT Exploits** – Technical talk on cyber security threats and defenses.
- **Road to ICPC** – Alumni guest talk by Mr. Yash Daga on competitive programming and ICPC preparation.
- **Research-a-thon 1.0** – Department-level research competition fostering experimental and analytical research skills.
- The Electrical Engineering Society successfully organized **AMPED** on December 3rd, 2025, from 10:00 am to 4:00 pm, as an intensive one-day technical competition designed to challenge, engage, and inspire undergraduate and graduate students in core areas of electrical engineering. The event aimed to bridge the gap between theory and practical application by encouraging participants to think critically and creatively while solving real engineering problems. Students participated in teams of two, fostering collaboration, effective communication, and teamwork (skills essential for professional engineering practice). AMPED attracted enthusiastic participation and created a competitive yet collaborative environment where students could etence and innovative thinking.

- The first half of the competition was dedicated to hands-on analog circuit design, where teams worked on breadboards to implement functional and innovative circuits. Participants were tasked with designing circuits capable of solving

differential equations as well as creating adjustable inverter and non-inverter configurations using operational amplifiers. This round emphasized practical understanding, component-level optimization, and creativity. Teams were evaluated based on the correct functioning of their circuits, the efficient use of components, specifically resistors, capacitors, and op-amps (and the overall elegance of the design). Special recognition was given to teams that presented highly novel, minimalistic, and efficient circuit solutions, and such teams were declared winners of this round, highlighting innovation alongside technical accuracy.

- The second half of AMPED transitioned into a MATLAB simulation and programming challenge, testing participants' analytical and computational skills. Once again working in teams of two, students were required to write MATLAB functions to perform tasks such as rotating matrices, computing Fourier series coefficients, simulating power systems, and designing a buck-boost converter. Each problem consisted of multiple sub-questions with varying levels of difficulty, ensuring that both fundamental understanding and advanced problem-solving abilities were assessed. Teams were judged on the correctness, clarity, and simplicity of their code, with emphasis on structured logic and efficient implementation. The event concluded with the announcement of winners and distribution of prizes, bringing the competition to a successful close and leaving participants with rewarding learning experience and valuable practical exposure



- The Department of Electronics Engineering, IIT (ISM) Dhanbad, successfully organized a five-day GIAN course titled “2D Materials for Emerging Electronics” under the coordination of Prof. Jeevesh Kumar. The course brought together distinguished experts and participants to explore the latest advancements in the field of

two-dimensional (2D) materials. **Prof. Ariel Ismach** from the Department of Materials Science and Engineering at **Tel Aviv University, Israel**, delivered enlightening lectures on the growth of large-area 2D materials using advanced CVD and MOCVD techniques. Prof. Jeevesh Kumar conducted comprehensive sessions on device fabrication, contact and dielectric engineering and electrical characterization methods. Overall, the program offered an enriching academic experience, igniting a fervent interest in the research of next-generation 2D electronic materials and devices and leaving participants inspired about the future of electronics.



- The Department of Electronics Engineering, IIT (ISM) Dhanbad is set to organize the second IEEE International Conference on **Electrical, Electronics, Communication and Computers (ELEXCOM-25)** from December 20 to 22, 2025, bringing together researchers, academicians, industry experts, and professionals from India and abroad. The three-day conference aims to

provide a global platform for discussing recent advancements in quantum technologies and cyber-physical systems, with a focus on their applications in electrical, electronics, communication, and computer engineering, along with special emphasis on next-generation communication technologies such as 6G and beyond.

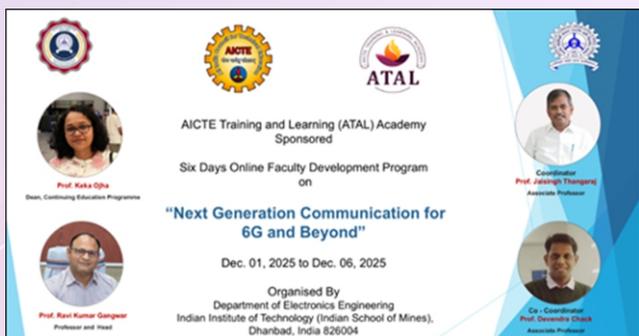


role of national and international organizations, industries, and government agencies in defining standards, roadmaps, and future requirements for quantum technologies, while researchers present papers on topics including VLSI, communication systems, artificial intelligence, machine learning, Internet of Things (IoT), intelligent computation, automation, and other emerging technologies shaping the future. A special session on digital and smart mining will

highlight IIT (ISM) Dhanbad's expertise and legacy in the mining sector. All technical sessions will be held at the Texmin Hall, I2H Building of IIT (ISM) Dhanbad, and the organizing committee emphasizes that the conference will provide an excellent opportunity for networking, exchange of innovative ideas, and exploration of international collaborations.



➤ The Department of Electronics Engineering successfully organized a six-day AICTE Training and Learning (ATAL) Online Faculty Development Program (FDP) on “Next Generation Communication for 6G and Beyond” in December 2025, under the coordination of Prof. Jaisingh Thangaraj, FDP Coordinator, and Prof. Devendra Chack, FDP Co-Coordinator. The FDP brought together eminent academicians, scientists, and industry experts from various organizations such as IIT Madras, IIT (ISM) Dhanbad, NIT Tiruchirappalli, Samsung R&D, ISRO, National Physical Laboratory and international research organizations.



The program covered emerging topics including optical and terahertz communication, WiFi-7, 5G/6G applications, drone communication, space radar systems, and RF technologies. The event witnessed enthusiastic participation from faculty members, research scholars and professionals across the country, fostering knowledge sharing, interdisciplinary learning and research collaboration. The FDP concluded

successfully with an online assessment, feedback session and valedictory function, receiving highly positive responses from

➤ The 2-Day National Workshop on “Smart Solutions for Environmental Applications” was held on **October 31–November 1, 2025**, at IIT (ISM) Dhanbad, with **Prof. Alok Sinha** as Convenor and **Prof. Sunil Kumar Gupta** and **Prof. Suresh Pandian E.** as Co-Convenors. The event was jointly organized by the **EIACP Programme Centre (RP), Department of Environmental Science and Engineering, IIT (ISM) Dhanbad** and **The Institution of Engineers (India) [IEI], Dhanbad Local Centre**. This workshop aims to explore and promote innovative smart technologies for environmental monitoring, air pollution control, sustainable water management, organic waste recycling, and climate change mitigation. Bringing together researchers, industry experts, policymakers, and students, the workshop fosters interdisciplinary collaboration and practical applications of smart solutions to address pressing environmental challenges, thus contributing to a citizen-centric, environment-friendly lifestyle and combating climate change.



Dhanbad (Pic I) & The dignitaries on the dice in (Pic ii)

➤ The Department of Environmental Science &

Engineering, IIT (ISM) Dhanbad, successfully organized the 2nd National Conference on “**Technological Advancements in Waste Management: Challenges and Opportunities**” (TAWMCO-2025) on **December 5–6, 2025**, as part of the Institute's Centenary Foundation Week (1926–2026), in association with the **TEXMiN Foundation, EIACP (PC-RP), and the ANRF PAIR-B Project.**



The inaugural session featured addresses by **Prof. Vipin Kumar, Prof. Alok Sinha, and Prof. Sukumar Mishra**, Director, IIT (ISM) Dhanbad, with the release of the conference souvenir and the presence of eminent dignitaries from academia, industry, and government. The two-day conference hosted six technical sessions, 24 keynote lectures, 33 oral presentations (hybrid mode), and 22 poster presentations across key themes in waste management, circular economy, resource recovery, and environmental technologies, fostering meaningful academic exchange, interdisciplinary collaboration, and professional networking, complemented by cultural events and a gala dinner.

- The **Centre for Mining Environment, Department of Environmental Science and Engineering**, organized the 35th National Convention of Mining Engineers and a National Seminar titled “*Mining and Environment – Quo Vadis-2070*” on November 7–8, 2025, at IIT (ISM) Dhanbad, in collaboration with the Institution of Engineers (India), Dhanbad Centre. The event

examined the future of mining and environmental sustainability, focusing on sustainable mining practices, technological innovations, critical minerals, land rehabilitation, energy transition, and environmental stewardship toward 2070, while also reflecting on 100 years of mining education in India as part of IIT (ISM)'s centenary celebrations.



Eminent experts, industry leaders, and academicians participated, with **Prof. Biswajit Paul** as Convener, and the inaugural ceremony graced by the Chief Guest, **Mr. Ujjwal Tah**, Director General of Mines Safety, along with several distinguished dignitaries from industry and academia.

- The Indian Institute of Technology (Indian School of Mines), Dhanbad, successfully hosted the **National Conference on Critical Metals: Recycling, Innovation, Separation, and Processing (CRISP 2025)** from October 13–15, 2025. Convened by **Dr. Aarti Kumari** with Co-Convener **Dr. Vishnu Teja Mantripragada**, the conference brought together experts to explore cutting-edge advancements in the extraction, recycling, separation, and lifecycle management of critical metals. The discussions placed a special emphasis on emerging technologies and sustainable practices, aiming to align scientific innovation with national priorities for resource

security and global sustainability goals.



➤ A two-day online workshop was organized by the Department of Environmental Science and Engineering on 8–9 December 2025, titled “*Mastering Dewatering & Groundwater Modeling: From Theory to Real-World Solutions (Predicting Inflows and Drawdowns with MODFLOW-NWT & Model Muse)*.” The workshop was convened by **Dr. Tinesh Pathania**, Assistant Professor, and co-coordinated by **Mr. Ashutosh Singh**, VD/CEO of Pratap Digitala Tjänster AB, Stockholm, Sweden.

Two Days Online Workshop
Mastering Dewatering & Groundwater Modeling: From Theory to Real-World Solutions
(Predicting Inflows and Drawdowns with MODFLOW-NWT & ModelMuse)
8-9 DECEMBER 2025

Patron: Prof. Sakuntar Mishra, Professor (H&S) & Director, IIT (ISM) Dhanbad

Co-Patron: Prof. Shreej Kumar, Professor (H&S) & Deputy Director, IIT (ISM) Dhanbad

Chairman: Prof. Aka Saha, Head of the Department, Environmental Science and Engineering

Convener: Prof. Tinesh Pathania, Assistant Professor, IIT (ISM) Dhanbad

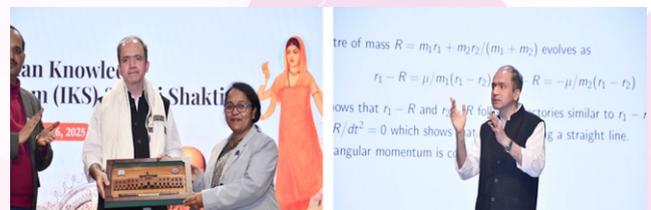
Invited Speaker: Dr. Ashutosh Singh, VD/CEO, Pratap Digitala Tjänster AB, Stockholm, Sweden

Department of Environmental Science and Engineering
 Indian Institute of Technology (ISM) Dhanbad, Jharkhand - 826004, India



➤ The Online Refresher Course on Research Methodology and Academic Writing, organised by the Department of Humanities and Social Sciences and the Malaviya Mission Teacher Training Centre, Indian Institute of Technology (Indian School of Mines), Dhanbad, sponsored by the UGC, Ministry of Education under the aegis Malaviya Mission Teacher Training Programme, was successfully conducted from November 3 to 15, 2025. The programme brought together faculty members and early-career researchers from across the country. Eminent scholars from Indian Institutes of Technology, National Institutes of Technology, and Central Universities delivered expert sessions covering philosophical foundations of research, qualitative and quantitative methods, academic writing, publication ethics, grant proposals, and digital research tools. Faculty members and research scholars from various higher educational institutions actively participated and engaged in meaningful academic discussions and collaborative learning throughout the course. The course significantly enhanced participants' research and publication competencies.

➤ The Department of Mathematics and Computing organized a Mathematics Colloquium on 6 December 2025 as part of the National Mathematics Day celebrations along with the institute's centenary celebration week. In this occasion, Prof. Kaushal Verma (Shanti Swarup Bhatnagar awardee 2014), Department of Mathematics, IISc Bangalore delivered a keynote lecture on “*Some Aspects of the Three-Body Problem*”.



tre of mass $R = m_1 r_1 + m_2 r_2 / (m_1 + m_2)$ evolves as

$$\ddot{r}_1 - R = -\mu / m_1 (r_1 - r_2) \quad \ddot{r}_2 - R = -\mu / m_2 (r_1 - r_2)$$

shows that $r_1 - R$ and $r_2 - R$ follow trajectories similar to $r_1 - r_2$

$R / dt^2 = 0$ which shows that R moves in a straight line.

angular momentum is conserved



- **Prof. A. Prasad** (Course Coordinator) and **Prof. A. Antony Selvan** (Course Co-coordinator) organized a Short-Term Program on "*Wavelet Analysis and Applications*", under the Malaviya Mission Teacher Training Programme (MMTTP) during November 10-15, 2025. The programme was designed to strengthen participants' understanding of Fourier and wavelet analysis, highlighting their theoretical foundations and effectiveness in analysing non-stationary signals. It introduced modern mathematical tools with clear and intuitive explanations, bridging theory with practical applications such as signal processing and data analysis. By the end of the course, participants were able to use these techniques confidently to solve complex problems and understand data more clearly.



- **Prof. S. Chatterjee** and **Prof. A. K. Singh** organized a **Short Term Course** on "*Introduction to Generative AI and its Application: A Step Forward to Artificial Intelligence*", from 27 October - 1 November 2025. The program aimed to cultivate a deep interest in Generative AI and demonstrate how it can be leveraged both for effective business management and for advancing research and project development. The program included a balanced mix of theoretical sessions, practical hands-on exercises, guiding participants through the process of developing small projects using Generative AI. This helped the participants to gain experiences on how to develop real-life projects as well as how to use Generative AI for practical applications.
- A hands-on training workshop titled "*Advances*

in Tunnelling: Integrating Machine Learning Applications with Numerical Modelling" (TUN-AID 2025) was conducted from 3–5 November 2025 by the Department of Mining Engineering, IIT (ISM) Dhanbad, as part of the Institute's centenary celebrations. The programme was organized under the convenorship of **Prof. Swapnil Mishra**, Assistant Professor (Convenor), and **Prof. D. Gopi Krishna**, Assistant Professor (Co-Convenor). The workshop featured expert lectures by **Dr. Bineshian Hoss**, Chief Principal Director (Technical), Amberg Engineering, **Prof. Byungmin Kim**, Assistant Professor, Department of **Urban & Environmental Engineering, Ulsan National Institute of Science and Technology (UNIST)**, along with eminent professionals from NHPC Ltd., ISRM, IEST Shibpur, COWI India, L&T, GEOCONSULT India etc.



- As part of the Centenary Celebrations of IIT (ISM) Dhanbad, the Department of Mechanical Engineering hosted the **1st International Conference on Thermo fluids Engineering (INCOTHERM 2025)** from October 10 to 12, 2025. The keynote lectures were delivered by some of the most distinguished researchers in the field, including: **Prof. P S Lee** (National University of Singapore), **Prof. SaritK Das** (IIT Madras), **Prof. Bidyut Saha** (Kyushu University, Japan), **Prof. Amit Agrawal** (IIT Bombay), **Prof. M. Ramgopal** (IIT Kharagpur), **Prof. Sandipan Kumar Das, Ph.D.** (IIT (ISM) Dhanbad), **Prof. Tanmay Basak** (IIT Madras), and **Prof. Dibakar Rakshit PhD** (IIT Delhi-Abu). Over three enriching days, 8 keynote lectures, 33 technical sessions, and 170+ research paper presentations from participants representing 10 countries made INCOTHERM 2025 a truly international and intellectually vibrant event. Selected papers will

be published in the special issues of Heat Transfer Engineering (Taylor & Francis), International Journal of Aeroacoustics (SAGE Publications), and ASME Journal of Engineering and Science in Medical Diagnostics and Therapy (JESMDT).



- The Global Initiative of Academic Networks (GIAN) course titled “*Statistical Mechanics of Active Matter: Principles, Models, and Applications*” was successfully conducted at the Indian Institute of Technology (Indian School of Mines), Dhanbad, from 6–11 October 2025. Organized under the Ministry of Education, Government of India, the course brought together participants from multiple institutions to explore the rapidly developing field of active matter. The lectures were delivered by **Prof. Zhiwei Peng (University of Alberta, Canada)** and **Prof. Pankaj Mishra (Department of Physics, IIT (ISM) Dhanbad)**. The program also benefited from the expert contributions of **Prof. Yashwant Singh**, Distinguished Professor, Department of Physics, Banaras Hindu University (BHU), Varanasi.

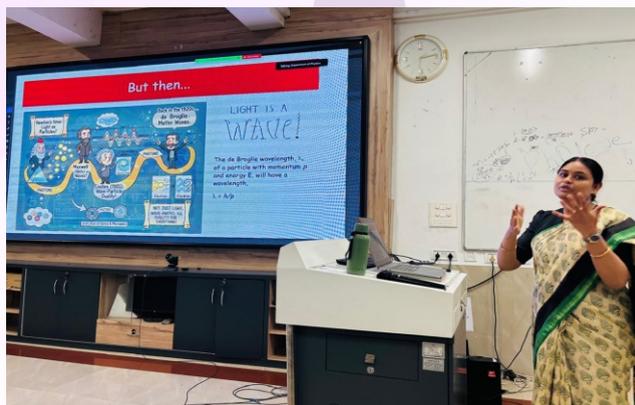


- Another Global Initiative of Academic Networks (GIAN) course on Astronomical Spectroscopy was successfully organised at IIT (ISM) Dhanbad, following its inauguration on 27th October 2025. The course was conducted by **Prof. Jonathan Tennyson, Department of Physics and**

Astronomy, University College London (UCL), UK, an internationally renowned expert in molecular spectroscopy and astrophysical modeling. The program was hosted by **Prof. Bobby Antony, Department of Physics, IIT (ISM) Dhanbad.**



- IBM's Qiskit Fall Fest 2025 was hosted in our campus from 27 October to 2 November. This week-long celebration marked the 100 years of quantum science. Organized by second- and third-year B.Tech students under the guidance of **Prof. Sumit Kumar**, the event brought together workshops, expert talks, interactive sessions aimed at introducing students to the world of quantum computing.
- A popular science talk was organized by the Society of Physics on October 23 in Raman Hall. The session was taken by **Prof. Sudeshna Sen**, who meticulously went through topic in both Classical Quantum Mechanics



- The ANRF Two-Day National Workshop: The Anusandhan National Research Foundation (ANRF) workshop, “*Wide Bandgap Semiconductors for Power Electronics*” was inaugurated on 13th November morning having

Prof. R. Thangavel, workshop coordinator.



- **Prof. Amit Agarwal** (IIT Kanpur), recipient of the **Rashtriya Vigyan Puraskar – Vigyan Yuva–Shanti Swarup Bhatnagar Award 2025**, delivered an inspiring lecture titled *“Importance of Science and Technology in Daily Life.”* on 27th November, at Golden Jubilee Lecture Theatre, IIT(ISM) Dhanbad.
- The Department of Physics successfully organized a seminar under the series *“Advances in Quantum Theory and its Frontiers”* on 1st December 2025, marking 100 years of quantum mechanics and the centenary year of the institute. The talk, *“Entanglement Detection via Randomized Measurements”*, was delivered by **Prof. Gniewomir Sarbicki** (Nicolaus Copernicus University, Poland) at Raman Hall, IIT (ISM) Dhanbad.

