Department of Metallurgy and Materials Engineering

METALetter

A Bi-Annual Newsletter
Nov 2024 - Mar 2025
Vol. 1 – ISSUE 2

IIEST Shibpur

MESSAGE FROM HOD

Dear Readers,

I am delighted to present the second issue of our bi-annual newsletter, covering the achievements and activities of the Department of Metallurgy and Materials Engineering at IIEST Shibpur from November 2024 to March 2025.

A key highlight was the successful conduct of METALLUM 6.0, our flagship three-day technical program held from February 14–16, 2025. The event brought together students, researchers, and professionals, offering a dynamic platform for academic exchange, workshops, and competitions.

Our faculty members have continued to publish extensively in reputed journals and contribute to leading book chapters—further strengthening our research presence. A special mention goes to Mr. Kabir Baidya, Ph.D. scholar, who received the Best Technical Paper Award at the Indian Paint Conference, showcasing the department's growing research impact.

Our students also performed exceptionally well at Technica 25, NIT Jamshedpur. Indranil Sarkar won Second Prize in Metal Morph; Sreshtha Mukherjee and Shakti Prasad Mohanty placed Third in Quizzica; and Mr. Mohanty also earned Third in Rhitorix, reflecting both technical proficiency and communication skills.

We continue to strive for excellence in research, teaching, and industry engagement. I extend my sincere thanks to all faculty, students, alumni, and partners for their continued commitment and contributions to the department's progress.

Warm regards,

Dr. Sukumar Kundu
Head of the Department
Metallurgy and Materials Engineering
IIEST Shibpur

Department of Metallurgy and Materials Engineering

Events

METALLUM 6.0 - Three-day Technical Program – Feb 14 - 16, 2025

Metallum is the annual symposium cum tech fest organized by the Society of Student Metallurgists at IIEST, Shibpur. Metallum connects students, faculty, and industry professionals for knowledge sharing, discussions on recent technological advancements, and collaboration opportunities.

Key Events

Pro-Recruit

This year a new key event "Pro-Recruit" was introduced which provides students an opportunity to experience and train themselves for potential placement opportunities. Invited Executives from industries conducted this event.

Dr. Avishek Kumar
Faculty-In Charge
Metallum 6.0

Other Major Events

Industrial Meet

A platform that brought together the leaders, industry experts and alumni to foster collaboration and innovation by sharing their knowledge and experience.

MetExposition

This technical paper presentation will provide students with an opportunity to showcase their research skills and gain recognition among their peers.

Metalloscape

A competition for poster presentation on technical topics. Students from our institute and also from other institute participated enthusiastically and demonstrated their technical and presentation skills.

Dr. A. K. Seal Memorial Quiz

Dr. Seal, under whom the Department of Metallurgy, BESU Shibpur found its impetus, and gradually rose to the uppermost echelons in its discipline. This quiz is to preserve and emulate his footsteps on the sands of time, which remain for metallurgists all over the world.

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Journal Publications

- Jayanta Kumar Saha, Rahul Samanta, Gurudas Mandal, Muralidhar Yadav and Swarup Kumar Ghosh: Experimental analysis of TMT bar and cold-drawn plain carbon steel spot welded mesh, Sādhanā, 49 (4) (2024) 300 (1-14).
- Sneha Roy and Swarup Kumar Ghosh: Influence of medium polyurethane coating on mechanical, wear, and corrosion performance of a galvanised steel sheet, Journal of Alloys and Metallurgical Systems, 9 (2025) 100174 (1-11).
- Jaideep Adhikari, Prerona Saha, Pritam Mandal, Sudip Kumar Sinha, Asiful H Seikh, Jabair A Mohammed, Manojit Ghosh, A Review on High Entropy Alloys as Metallic Biomaterials: Fabrication, Properties, Applications, Challenges, and Future Prospects, Biomedical Materials & Devices, 1-30, 2025, https://doi.org/10.1007/s44174-025-00314-4
- Debsundar Dey, Anik Pal, Pranjal Biyani, Pritam Mandal, Snehanshu Pal, Suchandan Das, Santanu Dey, Manojit Ghosh, Developing new high-entropy alloys with enhanced hardness using a hybrid machine learning approach: integrating interpretability and NSGA-II optimization, 2025/3/5, Journal of Materials Science Pages : 1-26, Publisher : Springer US, DOI : https://doi.org/10.1016/j.jalmes.2024.100144
- Debsundar Dey, Suchandan Das, Anik Pal, Santanu Dey, Chandan, Kumar Raul, Pritam Mandal, Arghya Chatterjee, Soumya Chatterjee, Manojit Ghosh, Improved machine learning framework for prediction of phases and crystal structures of high entropy alloys, Publication date : 2025/3/1, Journal of Alloys and Metallurgical Systems, Volume : 9, Pages : 100144, Publisher : Elsevier, DOI : https://doi.org/10.1016/j.jalmes.2024.100144
- Shilabati Hembram, Naveen Manhar Chavan, Avishek Roy, S Kumar, Abhijit Majumdar, Manojit Ghosh, Optimizing Properties of Cold Sprayed CuAlFeB Powder on EN AW7075 Substrate for Corrosion and Wear Resistance Applications, Publication date : 2025/1/31, Journal of Materials Engineering and Performance, Pages : 1-11, Publisher : Springer US, DOI : https://doi.org/10.1007/s11665-025-10651-6
- Soumyadeep Sen, Abhishek Ghosh, Arkajit Ghosh, Gyan Shankar, AF, Abd El-Rehim, Manojit Ghosh, Investigation of the Role of Non-octahedral Slip Planes in Tensile Deformation Behaviour of Naturally Aged Aluminium 6061 Alloy, Publication date : 2025/1/9, Metals and Materials International, Pages : 1-17, Publisher : The Korean Institute of Metals and Materials, DOI : https://doi.org/10.1007/s12540-024-01873-9
- Arash Ghasemi, Ali Reza Eivani, Seyed Mahdi Abbasi, Hamid Reza, Jafarian, Manojit Ghosh, Seyed Hashem Mousavi Anijdan, Al-Co-Cr-Fe-Ni-Ti High Entropy Alloys: A Review of Microstructural and Mechanical Properties at Elevated Temperatures, Publication date : 2025/01/05, Journal of Alloys and Compounds, Pages : 178216, Publisher : Elsevier, DOI : https://doi.org/10.1016/j.jallcom.2024.178216
- Subhodeep Paul, Pallab Roy, Arpita Chatterjee, Pinjal Pandit, Rahul Mukherjee, Manojit Ghosh, Design and Analysis of Automotive Vehicle Components with Composite Materials Using ANSYS 18.1, Publication date : 2024/12, Journal : Journal of The Institution of Engineers (India): Series D, Volume : 105, Issue 3, Pages 1537-1550, Publisher : Springer, DOI : https://doi.org/10.1007/s40033-023-00627-y
- K. Vijay Reddy ; Punit Kumar ; Saurabh Vashistha ; Snehanshu Pal ; Shailesh Kumar Singh;, Effect of structural modulation of B2 phase on the deformation mechanism in FeNiCrCoAl high entropy alloy: an atomistic insight, Materials Chemistry and Physics, 2025

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Journal Publications

- Debsundar Dey, Anik Pal, Pranjal Biyani, Pritam Mandal, Snehanshu Pal, Suchandan Das, Santanu Dey, Manojit Ghosh, Developing new high-entropy alloys with enhanced hardness using a hybrid machine learning approach: integrating interpretability and NSGA-II optimization, Journal of Materials Science, 2025
- Mouparna Manna; Snehanshu Pal (Corresponding Author), Irradiation damage evolution dependence on misorientation angle for sigma 5 grain boundary of Nb: An atomistic simulation-based study, MATS-24-1094, 1-22, Journal of Engineering Materials and Technology, 2024
- Manish Kumar Singh; Kaushal Kishore Singh; Snehanshu Pal, Predicting viscosity for steelmaking slag: A stacking regression approach, 1-17, Ironmaking & Steelmaking: Processes, Products and Applications, 2024
- Baidya K, Kumar A, Roy A, Das K. Enhancing the electro-elastic properties of a castor-oil-derived polyurethane/barium titanate piezoelectric energy-harvesting composite by integration of multiwalled carbon nanotubes. Polym Compos. 2025; 46(5): 4129-4146. doi:10.1002/pc.29228
- Avinash Kumar, Gopinath Thirunavukarasu, Sukumar Kundu: Electrochemical behavior and microstructure of diffusion welding of zirconium alloy and super duplex stainless steel, Volume 41, December 2024, 110735
- Avinash Kumar, Arindam Dhar, Gopinath Thirunavukarasu, Sukumar Kundu, Effect of processing temperature on interface microstructure of diffusion welded joint of super-duplex stainless steel and zirconium alloy with nickel alloy interlayer, Materials Chemistry and Physics Volume 322, 1 2024, 129312
- Avinash Kumar, Arindam Dhar, Ishita Koley, Sukumar Kundu, Interfacial microstructure and electrochemical behavior of diffusion welded joints of Zr-Alloy and super duplex stainless steel, Welding in the World, Volume 68, 2024, pp 2521-2535
- Gaurav Anand, Santanu Sardar, Satesh Sah, Ashim Guha, Debdulal Das, Multi-objective optimization to enhance surface integrity in WEDM for Al-matrix composite: A comparative assessment of self-weight adjusting MCDMs and objective weight integrated hybrid TOPSIS methods, Results in Surfaces and Interfaces, Volume 18, January 2025, 100467, https://doi.org/10.1016/j.rsurfi.2025.100467
- S Chatterjee, B Keshava, H Kumar, A Vishwakarma, S Kundu, T Mandal, Experimental investigation and numerical simulation of electrochemical response of Mg-Al-Zn-Ca alloy, Corrosion Engineering, Science and Technology, March 3, 2025, https://doi.org/10.1177/1478422X251321942

Conference Publications

- Sneha Roy and Swarup Kumar Ghosh: Corrosion performance of a polyurethane coating on a galvanized steel substrate, 1st International Conference on Advanced Materials and Manufacturing (ICAMM 2024), December 18-19, 2024, JIS University, Kolkata, 2024.
- S. Mishra, K. Das and S. K. Ghosh: Characterising Elastoplastic Behaviour of Quenched and Partitioned (Q&P) Steels using Experimental and Microstructure-based Finite Element Approaches, 3rd International Conference on Recent Trends in Materials Science and Devices (ICRTMD-2025), J.V.M.G.R.R. College, Charkhi Dadri, Haryana, India, 2025.
- Sneha Roy and Swarup Kumar Ghosh: Microstructure-Hardness Correlation in Rail Steel: Comparative Analysis of Unused, Used, and Heat-Treated Conditions, 3rd International Conference on Recent Trends in Materials Science and Devices (ICRTMD - 2025); 24 - 26 March, 2025, Haryana, India, 2025.
- Supriti Pramanik and Swarup Kumar Ghosh: Microstructure Analysis and Hardness Evaluation of High Strength Medium Manganese Steel, 3rd International Conference on Recent Trends in Materials Science & Devices (ICRTMD 2025), 24- 26 March, 2025, Haryana, India, 2025.
- Shibam Mishra, Indrajit Dey and Swarup Kumar Ghosh: Structure-Property Correlation of a Novel Quenched and Partitioned (Q&P) Steel, 39th Indian Engineering Congress, Organised by IE(I), December 20-22, 2024, Kolkata, 2024.
- Baidya K., Roy, A., and Das, K.: Study of particle distribution effect on electro-elastic properties for a castor-oil derived polyurethane/BaTiO3/MWCNTs three-phase energy harvesting piezoelectric smart coatings: Finite element analysis based prediction and experimental validation, International Union of Materials Research Societies - International Conference in Asia, 2024.
- Baidya K., Roy, A., and Das, K.: Enhanced energy harvesting performance of vegetable-oil derived polyurethane/BaTiO 3 /MWCNTs based three-phase piezoelectric smart composite coatings: Finite element analysis based prediction and experimental validation, ALLURE, 32nd Indian Paint Conference, Kolkata, 2025.
- Baidya K., Roy, A., and Das, K.: Improvement of the electro-elastic properties for piezoelectric energy harvesting smart polyurethane composite coating by integration of a conducting additive: Finite element analysis-based prediction and experimental validation, European Coatings Show Conference, Nuremberg, Germany, 2025.
- Baidya K., Roy, A. and Das. K.: Study of particle effect on electro-elastic properties for a castor-oil derived polyurethane/BaTiO3/MWCNTs three-phase energy harvesting piezoelectric smart coatings: Finite element analysis based prediction and experimental validation, 7th Regional Science and Technology Congress, Presidency University, Kolkata, 2025.

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Book Chapters & Edits

- Rahul Samanta, Sandip Kunar, Gurudas Mandal, Atul Bandyopadhyay, Arindam Biswas, Swarup Kumar Ghosh: Chapter 7: Recent Progress in Nanomaterial-Based IoT-Enabled Sensor, in Hybrid Nanostructures as Solid-State Sensors for IoT, Chapman and Hall/CRC, 2024, pp. 1-20.
- Swarup Kumar Ghosh, Muralidhar Yadav: Chapter 2: Correlation between Microstructure and Mechanical Properties of Hot Rolled Microalloyed Pipeline Steel, in Advances in Solid-State Welding and Processing of Metallic Materials, CRC Press, Boca Raton, 2025, pp. 17-34.
- Panwar, V., Chaflea, R., Bhomick, S., Mukherjee, R., and Das, K. (2025). Microstructure-Property Prediction of a Ni-Based Superalloy: A Multiscale Study. In: Zhou, K. (eds) Computational and Experimental Simulations in Engineering. ICCES 2024. Mechanisms and Machine Science, vol 176. Springer, Cham. https://doi.org/10.1007/978-3-031-82907-9_8

Research Project and Consultancy

Dr. Gautam Anand (PI)

Funding Agency: DST – Water Technology Initiative.

Title: Synthesis of high-entropy alloy-based sustainable and cost-effective catalysts for industrial wastewater treatment

Amount: **Rs 39.4 Lakh**

Research and Collaboration

PhD Awarded

- **Mr. Indrajit Dey** (Awarded on 16th January, 2025)
  Registration No:
  Fellowship: Institute fellowship
  Topic: Effect of Microalloying on Microstructure and Mechanical Properties of High Carbon Steel

Invited Lectures Delivered

Prof. Manojit Ghosh

Invited lecture: Controlling properties of Al alloys through alloy chemistry in a Professional Educational Courses (Online) on "A workshop on Machine Learning and Industrial Process metallurgy" (Course Number IIM-25-105) Online Mode 8, 9 and 10 January 2025 orgnized by the Indian Institute of Metals.

Dr. Sukumar Kundu

Invited lecture: Keynote lecture on "Solid state diffusion bonded joint of nuclear application" Faculty development Program, 13-17 January 2025, organized by MIT-WPU, School of Engineering and Technology. .

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Student's Achievement

Mr. Kabir Baidya, PhD scholar under Dr. Kaushik Das won the

- **Best Technical Paper Award** at Indian Paint Conference, Kolkata
- **Outstanding Paper Award** in Engineering &Technology at the 7th Regional Science and Technology Congress(Region -6, Kolkata Region)

Performance of 2nd Year Undergraduate Students in Technica
An annual departmental fest of Metallurgical and Materials Engineering of NIT Jamshedpur
held between 28th – 30th March 2025

- **Shrestha Mukherjee**, a second year undergraduate student secured third position in the event **Quizzica**
- **Shakti Prasad Mohanty** secured third position in both **Rhetorix** and **Quizzica**
- **Indranil Sarkar** secured second position in **Metal Morph**
- **Aritra Dutta** secured third position in **Rhetorix**