Department of Metallurgy and Materials Engineering

METALETTER

A Bi-Annual Newsletter
April-October, 2024

1856 १८५६
उत्तिष्ठत जाग्रत प्राप्य वरान निबोधत
INDIAN INSTITUTE OF ENGINEERING SCIENCE AND TECHNOLOGY, SHIBPUR
भारतीय अभियांत्रिकी विज्ञान एवं प्रौद्योगिकी संस्थान, शिवपुर

IIEST Shibpur

MESSAGE FROM HOD

Dear Readers,

It is with great pride that I address you through the inaugural issue of our bi-annual newsletter, showcasing the achievements and initiatives of the Department of Metallurgy and Materials Engineering at IIEST Shibpur. As the second-oldest metallurgy department in the country, we continue to uphold a legacy of excellence in education, research, and innovation.

This year, our department has achieved significant milestones. Our faculty members were recognized in the 2024 Elsevier Top 2% Scientists list and received the “K F Antia Memorial Prize”, underscoring the global impact of our research. Our students have also excelled, with Mr. Rajan Verma receiving the prestigious Tata Steel Annual Innovation Challenge Award, 'Mind Over Matter' for his innovative contributions.

We successfully organized the annual technical fest 'Metallum,' fostering technical exchange among students and professionals. Additionally, an Academia-Industry Meet on "Managing Energy & Environment in Steel-based Industries" was hosted, focusing on sustainable practices and the development of energy-efficient technologies.

While we celebrate these accomplishments, we aim to increase consultancy and research projects, further enhancing our industry engagement. We are also taking steps to launch an Executive M.Tech program catering to professionals seeking advanced knowledge in materials engineering.

As we strive for greater heights, I thank our faculty, students, alumni, and partners for their dedication and support. Together, we shall continue to uphold and enrich the legacy of our esteemed department.

Warm regards,

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

Events

One Day Workshop – 28th Feb, 2024

Managing Energy and Environment in Steel Based Industries: Research, Technology Application, and Development of Eco-friendly and Energy Efficient Business, on 28th February 2024 – jointly with IIM BESU Chapter and Millenium Institute of Energy and Environment Management

METALLUM 5.0 - Two-day Technical Program – Mar 20-21, 2024

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

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.

Dr. A. K. Seal Memorial Lecture 2024

Dr. V. Balasubramanian, Professor and Director, Center for Materials Joining and Research (CEMAJOR), Annamalai University delivered the 33rd Dr. A. K. Seal Memorial Lecture jointly organized with IIM BESU chapter at Biswa Bangla Convention Center, Kolkata on July 20, 2024.

Department of Metallurgy and Materials Engineering

Journal Publications

- Mandal, P., Choudhury, A., Mallick, A. B., & Ghosh, M. (2024). A voting-based ensemble classifier to predict phases and crystal structures of high entropy alloys through thermodynamic, electronic, and configurational parameters. Journal of Alloys and Metallurgical Systems, 100087.
- Roy, S., Mandal, P., Chowdhury, A., Abdullah-AL-Wadud, M., Seikh, A. H., Seikh, A. H., ... & Mukhopadhyay, A. (2024). Utilizing machine learning algorithms to predict accuracy of the Index of Relative Tectonic Activity (IRTA), Dhansiri (North) River Basin in India and Bhutan. IEEE Access.
- Adhikari, J., Dasgupta, S., Das, P., Gouripriya, D. A., Barui, A., Basak, P., Saha, P. (2024). Bilayer regenerated cellulose/quaternized chitosan-hyaluronic acid/collagen electrospun scaffold for potential wound healing applications. International Journal of Biological Macromolecules, 261, 129661.
- Paul, S., Roy, P., Chatterjee, A., Pandit, P., Mukherjee, R., Ghosh, M. (2024). Design and Analysis of Automotive Vehicle Components with Composite Materials Using ANSYS 18.1. Journal of The Institution of Engineers (India): Series D, 1-14.
- Muralidhar Yadav, Jayanta Kumar Saha and Swarup Kumar Ghosh: Evaluation of corrosion behaviour of galvanised, galvalume and colour coated steel sheets, Archives of Metallurgy and Materials, 69 (3), (2024) 865-879.
- I. Dey, R. Saha, B. Mahato, M. Ghosh, S. K. Ghosh: Effect of quenching and partitioning on microstructure and mechanical properties of high-carbon Nb microalloyed steel, Metallurgical and Materials Transactions A, 55 (2024) 2736-2755.
- Swarup Kumar Ghosh and Muralidhar Yadav: Effects of intercritical annealing on microstructure and mechanical properties of low C-Mn steels, Metallography, Microstructure and Analysis, 13 (2024) 817-831.
- S. K. Ghosh and Muralidhar Yadav: Influence of processing on microstructure, mechanical properties, and fracture behavior of a cast 2507 duplex stainless steel, Metal Science and Heat Treatment, 66 (3-4) (2024) 237-242.
- Mouparna Manna; Snehanshu Pal (Corresponding Author), Irradiation damage evolution dependence on misorientaton 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
- Snehanshu Pal (Corresponding Author), Sankhasubhra Mukhopadhyay, Development of Embedded-Atom Method (EAM) Potential for Palladium–Barium Alloy, 1-10, Molecular Simulation, 2024
- Sujan Hazra, Devi Dutta Biswajeet, Snehanshu Pal, Supratim Sengupta, Samik Nag, Seshadri Seetharaman, Inter-property Correlation of Al2O3-CaO-MgO-SiO2 Quaternary Slag System in Blast Furnace Ironmaking, Journal of Phase Equilibria and Diffusion, 2024
- Anindita Pati, T. K. Kundu, Snehanshu Pal, Exploring the influence of bis-phosphine ligands on lanthanide complexes: A DFT study, 1235, Computational and Theoretical Chemistry, 2024

Department of Metallurgy and Materials Engineering

Journal Publications

- Anindita Pati, T. K. Kundu, Snehanshu Pal, Chelating effect of alizarin-oxalate on La3+ and Nd3+ in acidic, basic and neutral medium: a DFT study, 143, Theoretical Chemistry Accounts, 2024
- I Levchenko, A Kumar, A AL-Jumaili, O Bazaka, EP Ivanova, C Riccardi, H Eduardo Roman, S Xu, M V Jacob, O Baranov, Kateryna Bazaka. Recent Progress in Marine Antifouling Technology Based on Graphene and Graphene Oxide Nanocomposite Materials, Advanced Engineering Materials 26 (2), 2300541
- Abhishek Kumar, Kaushik Das, Amritendu Roy, Improving the energy density and flexibility of PMN-0.3PT based piezoelectric generator by composite designing, 376, 115609, Sensors and Actuators: A. Physical, 2024
- Kabir Baidya, Abhishek Kumar, Amritendu Roy and Kaushik Das, Enhancing the electro-elastic properties of a castor-oil-derived polyurethane/barium titanate piezoelectric energy-harvesting composite by integration of multiwalled carbon nanotubes, 1-18, Polymer Composites, 2024
- Kabir Baidya, Abhishek Kumar, Amritendu Roy and Kaushik Das, Castor-oil derived polyurethane/barium titanate piezoelectric smart composite coatings for energy harvesting applications: Prediction and experimental characterization of electro-elastic properties, Polymer Composites, 2024
- Albert Linda; Ankit Singh Negi; Vishal Panwar; Rupesh Chafle; Somnath Bhowmick; Kaushik Das; Rajdip Mukherjee, μ2mech: A software package combining microstructure modeling and mechanical property prediction, 99(5), 055256, Physica Scripta, 2024
- 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, 2024, 68 (July), 2024, pp. 2521-2535
- 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, 322, 2024 (August), p. 129312
- Avinash Kumar, Gopinath Thirunavukarasu, Sukumar Kundu, Electrochemical behavior and microstructure of diffusion welding of zirconium alloy and super duplex stainless steel, Materials Today Communications, 41, 2024, p. 110735
- Arunabha M Roy, Suman Guha, Veera Sundararaghavan, Raymundo Arróyave. Physics-infused deep neural network for solution of non-associative Drucker–Prager elastoplastic constitutive model. Journal of the Mechanics and Physics of Solids, Volume 185, April 2024.
- Mandal, R., Ghosh, A., Sarkar, S., De, J., Mandal, T., Sen, R.S. and Majumdar, G., 2024. Parametric Optimization to Maximize Microhardness of Electroless Ni-Sn-P Coating Using Taguchi and Evolutionary Approaches. Journal of The Institution of Engineers (India): Series C, pp.1-15.
- Hassan, T., Sarkar, S., Mandal, T., Mondal, N., & Majumdar, G. (2023). FEA Based Design and Stability Study of Electroless Ni-P Coating Plated over a Stepped Shaft under Thermal Load. Australian Journal of Mechanical Engineering, 22(4), 739–750.

Conference Publications

- Jain, V., Kumar, V., Mistri, A., Jain, M., Choudhury, A., & Ghosh, M. (2023, October). Random Walker based Automated Phase Discrimination and Morphological Insights in Ultra-High Carbon Steel. In 2023 4th International Conference on Data Analytics for Business and Industry (ICDABI) (pp. 482-487). IEEE.
- Sneha Roy and Swarup Kumar Ghosh, Colour-coated steels: mechanical properties, wear resistance, and corrosion resistance, International Conference on Processing of Minerals, Metals and Materials: Beyond Tomorrow (ICPMMM2024), 28-29 March, 2024.
- Pundan K Singh, Abhishek Raj, Suman Guha, Pinaki Biswas, C Lakshmana Rao, Cemal Basaran, Rahul K Verma. Experiments & Modeling for Unified Mechanics Theory based Fracture Modeling of Advanced High Strength Steel. In 6th Indian Conference on Applied Mechanics (INCAM), NIT Warangal, July 2024.

Book Chapters & Edits

- Rahul Samanta, Gaurav Kumar Bansal, Swarup Kumar Ghosh, Gurudas Mandal: Properties and applications of bainitic railway steel prepared by mechanical alloying, Chapter 7, In: Advancements in Powder Metallurgy: Processing, Applications and properties, pp. 166-187, IGI Global Publisher, DOI: 10.4018/978-1-6684-9385-4.ch007.
- Saha, P., Nandi, A., Adhikari, J., Ghosh, A., Seikh, A. H., & Ghosh, M. (2024). Current Progress and Future Perspectives of Biomaterials in 3D Bioprinting. Advances in Additive Manufacturing, 61-87. https://doi.org/10.1002/9781394238316.ch4
- Kumar, V., Mistri, A., Verma, R. K., Jain, V., & Ghosh, M. Exploring the frontiers of nanofinishing for biomedical implant applications in healthcare. In Nanofinishing of Materials for Advanced Industrial Applications (pp. 59-77). CRC Press. doi: 10.1201/9781003496298-4
- Kumar, V., Mistri, A., Jain, V., & Ghosh, M. (2024). Computational Engineering for 3D Bioprinting: Models, Methods, and Emerging Technologies. 3D Bioprinting from Lab to Industry, 301-322. https://doi.org/10.1002/9781119894407.ch10
- Jain, V., Saha, P., Ghosh, A., Ghosh, A., Das, K., Murmu, U. K., & Ghosh, M. (2024). Recent Developments and Optimization in Additive Manufacturing of Aluminum Alloys. Optimization of Advanced Manufacturing Processes, 167-183. Doi: 10.1201/9781003487128-10
- Saha, P., Ghosh, A., Das, K., Murmu, U. K., Kunar, S., & Ghosh, M. (2024). Laser Welding of Aluminum Alloys. Laser-Assisted Machining: Processes and Applications, 207-225. https://doi.org/10.1002/9781394214655.ch12
- Saha, P., Thomas, S., Kim, J., & Ghosh, M. (Eds.). (2024). 3D Bioprinting from Lab to Industry. John Wiley & Sons. https://doi.org/10.1002/9781119894407

Research Project and Consultancy

- Consultancy on Investigation for premature breakage of Lock in Centre Buffer Coupler as used in Indian Railway Freight Wagons, Funding Agency: Lalbaba Engineering Group,27, Shakespeare Sarani, Kolkata - 700017, West Bengal, India. – **Dr. Snehanshu Pal**

- Archaeometallurgical Investigation of Metal Objects at Hastinapur Archaeological Site between 1000 BCE to 16th Century CE (DST, PI: **Dr Gautam Anand**, **Amount: 52.4 Lakh**

Research and Collaboration

PhD Awarded

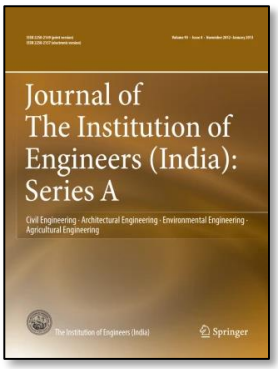
- **Jaideep Adhikari** (Awarded on 25th June, 2024)
  Registration No.: PhD/R/2017/0095
  Fellowship: Institute fellowship
  Topic: Weldability studies of aluminium based alloys Aa6061, AA7075 and AISI 304Lstainless steel by friction stir and laser welding techniques

- **Biplab Ghosh** (awarded on August 8, 2024)
  Registration No.: PhD/R/2014/0068
  Fellowship: Part Time
  Topic: Development of functionalized cellulose/collagen based biomimetic scaffolds for skin and bone tissue engineering

Awards and Achievements

Prof. Manojit Ghosh

- K F Antia Memorial Prize" for the article "Application of SiC and graphite reinforced Aluminium Matrix composites in braking systems and its validation through finite element analysis" published in the Journal of Institution of Engineers: Series D, Volume 104, Year: 2024
- Editor of book 3D Bio-printing from Lab to Industry, Wiley, Year: 2024



ELSEVIER

Prof. Debdulal Das has been recognized among the Elsevier's top 2% researcher from India in 2024 under the category of Mechanical Engineering and Transports with a rank of 210036.

Prof. Debdulal Das

Student's Achievement

2nd Runner Up Prize in the annual innovation challenge of Tata Steel - "Mind Over Matter"

Mr. Rajan Kumar Verma, M.Tech student received the 2nd Runner Up prize with a cash award of Rs. 50000 along with a certificate and **Pre-Placement Offer to join Tata Steel as Management Trainee** R&T (at cadre entry level).