Dr. AMULYA BIHARI PATTNAIK

Assistant Professor | Metallurgical & Materials Engineering

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PROFESSIONAL PROFILE

Faculty member in Metallurgical and Materials Engineering with extensive academic, research, laboratory and administrative experience at IGIT Sarang. Research and technical experience spans corrosion science and engineering, mechanical behaviour of metals and alloys, physical metallurgy, wear, microstructure characterisation and acoustic emission-based deformation analysis. Experienced in teaching undergraduate and postgraduate courses, managing materials laboratories, handling advanced characterisation/testing equipment, and contributing to departmental and institute-level academic administration.

RESEARCH INTERESTS

- Corrosion of low-alloy steels in ambient and laboratory-based environments, with emphasis on passive-film characterization.
- Mechanical behaviour of materials at ambient, high and low temperatures under slow and nominal strain rates.
- Effects of material chemistry, microstructure, cold work, temperature and prior deformation on the mechanical behaviour of metals and alloys.
- Creep behaviour of metals and alloys.
- Physical metallurgy: structure–property relationships and characterization of degraded microstructures using SEM, XRD, TEM, EPMA and related techniques.
- Acoustic emission signal analysis for studying deformation behaviour.
- Artificial Intelligence and Machine Learning in Materials Engineering.

ACADEMIC QUALIFICATIONS

Degree	Specialization	Institution / University	CGPA / Percentage	Year
Ph.D.	Metallurgical Engineering & Material Science	Indian Institute of Technology Bombay (IIT Bombay)	8.45	2026
M.Tech.	Material Resource Engineering	AcSIR, New Delhi / CSIR-Institute of Minerals and Materials Technology, Bhubaneswar	8.49 (Honors with Distinction)	2012
B.Tech.	Metallurgical & Materials Engineering	B.P.U.T., Rourkela / Indira Gandhi Institute of Technology, Sarang	8.71 (Branch Topper)	2010

PROFESSIONAL EXPERIENCE

Assistant Professor	Indira Gandhi Institute of Technology (IGIT), Sarang, Odisha	Aug 2014 – Present
Scientist	CSIR–Advanced Materials and Processes Research Institute (AMPRI), Bhopal, Madhya Pradesh	Mar 2013 – Jul 2014
Scientist Trainee	CSIR–Institute of Minerals and Materials Technology (IMMT), Bhubaneswar, Odisha	Aug 2010 – Mar 2013

TECHNICAL & LABORATORY EXPERTISE

- Metallurgical microscopy with image analysis (LEICA 3000M).
- X-Ray Diffractometer (Bruker XRD).
- Acoustic Emission System (PCI-DiSP), 4-channel.
- Universal Testing Machines: servo-hydraulic and screw-driven systems; Tinius Olsen 50 kN Material Testing Machine.
- Instron Impact Testing Machine and high-strain-rate impact testing.
- Ultrasonic Flaw Detector with phased-array technology.
- Air Jet Erosion Tester (Ducom).
- Dynamic Elastic Property Analyzer (DEPA) and Lensis Thermal Mechanical Analyzer.
- Universal Hardness Tester.
- SEM / FESEM, including Nova Nano SEM with EBSD.
- VIBXPERT noise and vibration analyser.

SELECTED JOURNAL PUBLICATIONS

- Pattnaik AB, B. Jha B. Effect of microstructural degradation on acoustic emission during tensile deformation of 2· 25Cr–1Mo steel. Canadian Metallurgical Quarterly. 2013 Apr 1;52(2):217-21.
- Pattnaik AB, Jha BB, Sahoo R. Effect of strain rate on acoustic emission during tensile deformation of α-brass. Materials Science and Technology. 2013 Mar;29(3):294-9.
- Pattnaik AB. Erosive wear analysis of normalized and thermally aged 2.25 Cr-1Mo steel using Taguchi experimental design. Indian J. Eng. Mater. Sci. 2014 Aug 1; 21:379-86.
- Pattnaik AB, Das S, Jha BB, Prasanth N. Effect of Al–5Ti–1B grain refiner on the microstructure, mechanical properties and acoustic emission characteristics of Al5052 aluminium alloy. Journal of materials research and technology. 2015 Apr 1;4(2):171-9.
- Pattnaik AB, Das S, Jha BB. Effect of forging on microstructure, mechanical properties and acoustic emission characteristics of Al alloy (2014): 10 wt.% SiCp composites. Journal of Materials Engineering and Performance. 2019 May 15;28(5):2779-87.
- Pattnaik AB, Das S. Probability of formation of wear debris during initial running-in period of sliding wear of Al-Si (LM13)-10 wt.% fly ash composites. Journal of Materials Engineering and Performance. 2020 Nov;29(11):7480-7.

- Sarkar A, Basu S, Pattnaik AB, Jaya BN, Karagadde S, Samajdar I, Kumar H, Kumar R, Mythili R, Ghosh C, Dasgupta A. The defining role of micro-fissures on the mechanical behavior of laser-welded fully austenitic stainless steel. Metallurgical and Materials Transactions A. 2022 Jun;53(6):2116-29.
- Pattnaik AB, Roy S, Raja VS, Parida S. Understanding the structure and electrochemical behavior of the rust layer formed on a high-strength low-alloy structural steel under cyclic exposure to polluted marine atmosphere. Journal of Materials Engineering and Performance. 2025 Feb;34(3):2093-106.
- Pattnaik AB, Raja VS, Parida S. New insights into the effect of chloride ions on structure and composition of rust layers. Corrosion Engineering, Science and Technology. 2026 Jun;61(4):491-507.
- Pattnaik AB, Srinivasan Raja V, Parida S. Mechanistic Insights Into Atmospheric Corrosion Behaviour of Interstitial-Free Steel Under Tropical Marine Climate of Mumbai. Materials and Corrosion. 2026 Jul 9.

CONFERENCE PRESENTATIONS / PROCEEDINGS

- "Acoustic Emission during Tensile Deformation of 2.25Cr-1Mo Steel," 3rd Asian Symposium on Materials and Processing, IIT Madras; paper accepted for publication as conference proceeding.
- "Effect of Microstructural Degradation on Acoustic Emission during Plastic Tensile Deformation of 2.25Cr-1Mo Steel," 3rd International Conference on Thermo-Mechanical Simulation and Processing of Steel (SIMPRO 2012), RDCIS, SAIL, Ranchi.
- "Effect of Strain Rate on Acoustic Emission during Tensile Deformation of α-Brass," National Conference on Processing and Characterization of Materials, NIT Rourkela, 2012.
- "Effect of Al-5Ti-1B Grain Refiner on Microstructure and Mechanical Properties of Al5052 Aluminium Alloy," International Conference on Emerging Materials and Processes, CSIR-IMMT Bhubaneswar, 2014.
- S.K. Sahoo, J. Majhi, A.B. Pattnaik, J.K. Sahoo & S. Das, "Mechanical Properties Enhancement and Microstructure Study of Al-Si-TiB_2 In Situ Composites," IOP Conference Series: Materials Science and Engineering, 338(1), 012060, 2019.
- S.R. Rana, A.B. Pattnaik & S.C. Patnaik, "Comparison of Wear Behavior and Mechanical Properties of as-Cast Al6082 and Al6082-T6 Using Statistical Analysis," IOP Conference Series: Materials Science and Engineering, 338(1), 012050, 2019.
- J. Pany, R.K. Barik, S.K. Sahoo, S.C. Patnaik, J. Majhi & A.B. Pattnaik, "Mathematical Modeling for the Prediction of Wear Rate of Al-12.6Si/TiB_2 In Situ Composites," Materials Today: Proceedings, 33, 5530–5533, 2020.
- Pattnaik AB, Parida S. Materials degradation: metallic materials. InNew Horizons in Metallurgy, Materials and Manufacturing 2022 Oct 9 (pp. 107-122). Singapore: Springer Nature Singapore.
- Pattnaik AB, Patra A, Mahanta S, Anushree A. Identification of Key Environmental Factors Affecting Atmospheric Corrosion of Mild Steel Using Machine Learning Techniques. InComputing, Communication and Intelligence (pp. 236-238). CRC Press.
- Pattnaik AB, Dash B, Nanda U, Patnaik SC. Optimization of Dry Sliding Wear Behaviour of AA6061 (as Cast) and AA6061 (HT) Aluminium Alloy Using Design of Experiment Approach.

TEACHING EXPERIENCE AT IGIT SARANG

Type	Course Code	Course Title	Level	Teaching Period
Theory	PMT6J004	Nonferrous Extractive Metallurgy	UG	Autumn 2014–15
Theory	PMT7J001	Materials for Advanced Applications	UG	Spring 2015–16; Spring 2016–17
Theory	PMT4I104	Deformation Behavior of Materials	UG	Spring 2016–17; Autumn 2017–18; Autumn 2018–19 Spring 24-25 Spring 23-24 Spring 25-26
Theory	PMT3I102	Metallurgical Thermodynamics and Kinetics	UG	Autumn 2017–18
Theory	PCMT 4202	Transport Phenomena	UG	Autumn 26-27
Theory	PC 2	Mechanical Behavior of Materials	PG	Spring 2017–18
Theory	PC 1	Transport Phenomena in Metallurgy	PG	Spring 2018–19
Laboratory	—	Deformation Behavior of Materials Lab	UG	Spring 2016–17; Autumn 2017–18; Autumn 2018
Laboratory	—	Metallurgical Thermodynamics and Kinetics Lab	UG	Autumn 2017–18
Laboratory	—	Material Processing and Process Metallurgy Lab	PG	Spring 2017–18

AWARDS, FELLOWSHIPS & RECOGNITION

- QIP Fellowship from AICTE to pursue Ph.D. at IIT Bombay.
- POSCO ASIA FELLOWSHIP (2007), provided by the POSCO TJ Park Foundation, South Korea, for securing the highest marks in the university examination.
- CSIR Quick Hire Fellowship, received in August 2010.
- Qualified GATE three times consecutively in Metallurgical Engineering: 2010, 2011 and 2012.
- Life Member, Indian Institute of Metals (IIM).
- Life Member Institution of Engineers India.

ADMINISTRATIVE & ACADEMIC RESPONSIBILITIES AT IGIT SARANG

- Member, Institute Purchase Committee (July 2018 – July 2019).
- Deputy Center Superintendent, University Examinations (July 2016 – July 2019).
- Deputy Center Superintendent, Faculty Recruitment Examination.
- Member, Department Purchase Committee (July 2018 – July 2019).
- Course Coordinator BTech. (2023-2026)
- Departmental Coordinator Career Development Cell of the institute
- Laboratory In-Charge, Advanced materials and Processing laboratory.
- Member, Department Board of Studies.
- Representative to Central Library from Metallurgical and Materials Engineering Department.
- Convenor, ADMANTIUM 3.0, a techno-cultural event of the department.
- Assistant Superintendent, Brahmos Bhawan hostel.

REVIEWER OF REPUTED JOURNALS

- Canadian Metallurgical Quarterly, Taylor and Francis.
- Indian J. Eng. Mater. Sci. CSIR
- Corrosion Science, Elsevier

REFERENCES

Prof. Smrutiranjan Parida | Professor, Metallurgical and Material Science Engineering Department, IIT Bombay Email: paridasm@iitb.ac.in | Phone: 9004996253

Prof. V.S. Raja | Professor, Metallurgical and Material Science Engineering Department, IIT Bombay Email: vsraja@iitb.ac.in | Phone: +91-9869769984