

Faculty	Dr. Arpita Patro, M.Sc., Ph.D. Assistant Professor Department of Physics East Point College of Engineering & Technology
	Profile Dr. Arpita Patro is a Physics researcher specializing in Materials and Nanotechnology, holding a Ph.D. from Centurion University of Technology & Management. Her research expertise focuses on modifying transition metal oxide nanomaterials (nanoparticles, nanorods, and nanowires) via low-energy ion irradiation. She uses techniques like nitrogen and argon bombardment to engineer defect states for high-performance supercapacitor energy storage electrodes, while altering surface chemistry to transition materials from hydrophilic to superhydrophobic states. Her technical capabilities encompass dynamic Monte Carlo simulations and modeling (SRIM/TRIM, TRI3DYN, IRADINA), advanced characterization analysis (XRD, FESEM, Raman, XPS, UV, ECM and contact angle measurement) and chemical synthesis methods both top down and bottom-up approach processes. Dr. Patro's scientific achievements include an International Travel Grant from the Government of Japan and ANRF (India) for ICPEAC 2025, the Best Oral Presentation awards at ICNIB 2023 from Ion beam Society of India and from CUTM, Odisha, and several national conference prizes (Oral & Poster). Her academic footprint features over a dozen peer-reviewed publications in top-tier journals and published book chapters with CRC Press and Springer. Additionally, she has engaged with major institute and research centers like IIT, IISER, NISER, IUAC and VECC centers. Her long-term vision centers on leveraging low-energy ion beam irradiation and computational material modeling such as Monte Carlo simulations to precisely tailor nanostructure surfaces. By bridging atomic-scale surface engineering with real-world energy storage and wetting applications, she aims to develop scalable, high-performance nanomaterials and supercapacitors that drive next-generation, sustainable technological solutions.
	Publications A. Patro, et al. (2026). <i>"Tailoring the hydrophobic response of Cobalt oxide hetero nanostructures via low-energy nitrogen ion bombardment."</i> Applied Surface Science, North-Holland, 167377. DOI: https://doi.org/10.1016/j.apsusc.2026.167377 S. Raut, A. Patro, et al. (2026). <i>"Green synthesized ZnO-Ag functionalized electrospun PAN nanofibers for efficient crystal violet dye removal: A combined experimental and computational approach."</i> Nano-Structures & Nano-Objects, 101598. DOI: https://doi.org/10.1016/j.nanoso.2025.101598 A. Patro, et al. (2025). <i>"Defect Engineered Nickel oxide nanorods by Low Energy Nitrogen Ion exposure for Supercapacitor Applications."</i> Material Advances, Royal Society of Chemistry. DOI: https://doi.org/10.1039/D5MA00613A A. Patro, et al. (2025). <i>"Transition from hydrophilic to nearly hydrophobic state in manganese oxide nanoparticles triggered by low-energy argon ion irradiation."</i> Radiation Effects and Defects in Solids, Taylor and Francis, pp. 1. DOI: https://doi.org/10.1088/1361-6528/adce12 A. Patro, et al. (2025). <i>"Ion beam modification of one-dimensional nanomaterials: A review."</i> Nanotechnology, IOPScience, 36, 212001. DOI: https://doi.org/10.1088/1361-6528/adce12 A. Patro, et al. (2024). <i>"Enhanced electrochemical capacitance of titanium"</i>

	<i>oxide nanoparticles using low-energy nitrogen ion irradiation.</i>" New Journal of Chemistry, Royal Society of Chemistry, 48, 9694-9701. DOI: https://doi.org/10.1039/D4NJ01066C 7. A. Patro, et al. (2024). "Wetting properties alteration due to cluster formation by the precise joining of iron oxide nanoparticles on low energy nitrogen ion irradiation." AIP Conference Proceedings, AIP Publishing, 2995(1). DOI: https://doi.org/10.1063/5.0178395 8. S. Dhal, A. Patro, et al. (2024). "Hydrophilic to near-hydrophobic transition by the joining of nickel oxide nanorods on 5 keV nitrogen ion irradiation." AIP Conference Proceedings, AIP Publishing, 2995(1). DOI: https://doi.org/10.1063/5.0178391 9. M. Swain, D. Das, P. K. Rath, A. Patro, & S. Dhal (2024). "Development of an ion beam diagnostics for small accelerator." AIP Conference Proceedings, AIP Publishing, 2995(1). DOI: https://doi.org/10.1063/5.0178067 10. A. Patro, S. Dhal, et al. (2023). "Augmented electrochemical properties of Manganese Oxide nanorods on low energy nitrogen ion irradiation." Journal of Alloys and Compounds, Elsevier, 960, 170441. DOI: https://doi.org/10.1016/j.jallcom.2023.170441 11. A. Patro, S. Dhal, et al. (2023). "Cluster formation by the precise joining of iron oxide nanoparticles on low energy nitrogen ion irradiation." Radiation Effects and Defects in Solids, Taylor and Francis, 178(7-8), 976-989. DOI: https://doi.org/10.1080/10420150.2023.2197229 12. S. Dhal, P. Das, A. Patro, et al. (2021). "Tuning surface wettability of Molybdenum Oxide nanorod mesh by low energy ion beam irradiation." Radiation Physics and Chemistry, Pergamon, 109649. DOI: https://doi.org/10.1016/j.radphyschem.2021.109649
	Books 1. Arpita Patro, et al. (2025, May). "Metal Oxide High K Dielectrics for Stretchable Electronics." CRC Press, pp 333, ISBN 9781003352365. DOI: https://doi.org/10.1201/9781003352365 2. Arpita Patro, et al. (2024, September). "Carbon Nanotube-Polymer Nanocomposites: Morphological and Magnetic Properties." Engineering Materials, pp 83–103, ISBN 978-981-97-6328-3. DOI: https://doi.org/10.1007/978-981-97-6329-0
	Conferences/Workshops • 68th DAE Solid State Physics Symposium, Bhabha Atomic Research Centre (BARC), Mumbai, India (2024). • 7th International Conference in Nanostructuring by Ion Beams (ICNIB), UPES, Dehradun, India (2023). • 8th International Conference on Nanotechnology for Better Living, NIT-Srinagar, Kashmir, India (2023). • 66th DAE Solid State Physics Symposium, BIT Mesra, Ranchi, India (2022). • 7th International Conference on Ion Beams in Materials Engineering and Characterization (IBMEC-2022), IUAC, Delhi, India (2022). Advanced Schools & Advanced Training: • International School on Ion Beams in Materials Science (IBMS-2022), Inter University Accelerator Centre (IUAC), Delhi. • One-Week Training Program on Advanced Instrumental Techniques in Chemistry and Material Sciences (AITCMS22), BIT Mesra, Ranchi. • Advanced School on ECR Ion Source Technology: Opportunities and Future Challenges, IUAC, New Delhi. • CSIR Summer Research Training Program (SRTP), CSIR-North East

	Website Contents Institute of Science and Technology (NEIST), Jorhat.
	Research institution and research centres I have actively engaged with leading research facilities across India, including - Indian Institute of Technology (IIT, Bhubaneswar) - Indian Institutes of Science Education and Research (IISER, Berhampur) - National Institute of Science Education and Research (NISER, Bhubaneswar) - Inter-University Accelerator Centre (IUAC, New Delhi) - Variable Energy Cyclotron Centre (VECC, Kolkata) - Pondicherry University (PU, Pondicherry)
	Achievements / Awards / Recognitions International Travel Grant: Awarded by the Government of Japan and ANRF, India to present advanced research at the 34th International Conference on Photonic, Electronic and Atomic Collisions (ICPEAC 2025) in Sapporo, Japan. Best Oral Presentation Award: 7th International Conference on Nanostructuring by Ion Beams (ICNIB 2023), jointly hosted by Ion Beam Society of India, UPES Dehradun, and Inter University Accelerator Centre (IUAC), New Delhi. 3rd Prize in Oral Presentation: International Conference on Materials for Sustainable Environment (2024), Centurion University of Technology & Management, Odisha, India. 2nd Prize in Oral Presentation: International Conference on Research on Recent Advances in Materials (2022), Centurion University of Technology & Management, Odisha. 2nd Prize in Poster Presentation: National Science Day (2020), Centurion University of Technology & Management, Odisha, India.
	TECHNICAL EXPERTISE Ion-Matter Interaction & Simulation: SRIM / TRIM (proficient in ion transport, damage, and implantation modelling), TRI3DYN & IRADINA (dynamic Monte Carlo simulations for structural and compositional shifts). Data Analysis & Visualization: Origin Pro 8.5 (advanced data analytics, scientific graphing), RUMP / SIMNRA (Rutherford Backscattering Spectrometry & Nuclear Reaction Analysis data processing), X'Pert HighScore (XRD phase and crystallographic analysis), Image J (morphological mapping, particle size distribution, and HRTEM d-spacing calculations). Computational Materials Science: BIOVIA Materials Studio (atomic/molecular scale structural property simulations). Experimental Synthesis Routes: Hydrothermal, Co-precipitation, Ball Milling, Sol-Gel, Reflux, Green Synthesis, Chemical Route, and Ultrasonication.