Abstract:
Developing cost-effective near-metal-free systems or single-atom (SA) oxygen reduction (ORR) electrocatalysts is a significant challenge in H_2-O_2 fuel cell technology. The utilization of maximum atoms in SA catalysts represents a promising approach to downsizing metal sites.
Reticular chemistry emerges as a powerful tool for designing functional single-atom catalysts (SACs) with enhanced intrinsic electrocatalytic activity. Dynamic covalent chemistry offers a versatile strategy for catalyst design, allowing for the precise tuning of d-band centers of metals through π-d interactions and the creation of defect-free electrocatalytic sites. Global porous supports with abundant edge-plane atoms can be strategically engineered using various pre-synthetic and post-synthetic modifications.
The incorporation of heteroatomic compositions and porous channels enhances asymmetric spin-charge distributions and efficient mass transfer respectively to boost ORR kinetics. Overall, this integrated approach leveraging reticular and dynamic covalent chemistry holds a promise to bridge between homogeneous and heterogeneous electrocatalysis.

Biography:
This is Subhajit Bhunia. Born and grew up in West Bengal. I completed B.Sc. from the University of Calcutta (College: Ramakrishna Mission Residential College, Narendrapur), in the year 2011. I did my M.Sc. from IIT Bombay, in the year 2013. I completed my PhD from the Indian Association for the Cultivation of Science, Kolkata (Advisor: Prof. Santanu Bhattacharya) in the year 2021. Right now, I am employed as a postdoc at the University of Texas at El Paso (Advisor: Prof. Luis Echegoyen 2021-2023; Prof. Carlos R Cabrera 2023-now).