Sharat S.A.

Master of Science in Chemistry and Data Science

Indian Institute of Science Education and Research, Mohali

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Materials researcher with a core competency in analytical chemistry and electrochemistry. Four years of experience across multiple cell chemistries, electrocatalysis and organic transistors - from simulation to synthesis. Currently working with ASSBs. Believe in bridging science and society through outreach and policy research.

Education

2025 **Integrated BS-MS | Chemistry Major, Data Science Minor** — **8.2/10 CGPA**
Indian Institute of Science Education and Research, Mohali (India) — Thesis Grade: A (Highest)

2020 **CBSE Grade 12 | Physics, Chemistry & Mathematics** — **96% Marks**
Saraswati Public School, Jagadhri (India) — School Topper

Publications

1. "**Acoustic and Impedance Analysis of Solid Electrolytes for All-Solid-State Batteries**" - Master's thesis by **Sharat SA** under supervision of Naga Phani Aetukuri and Angshuman Roy Choudhary, 2025. Thesis Link: DSpace@IISERMohali [Embargoed until April 2028]
2. "**In-situ Raman investigations of Fe-coated Ni OER electrodes**", Efthimiopoulos I, Zhang S, Samisereht N, **Sharat SA**, Ebbinghaus P, Mehrmann C, et al. *Advanced Energy and Sustainability Research* [Under Review] [Preprint: 10.26434/chemrxiv-2024-6jbn4].
3. "**Shouldn't charge transfer resistance be lower for solid-state electrolytes?**" Rana AK, **Sharat SA**, Maity S, Aetukuri NP, et al. [In preparation]

Scholarships & Awards

2025 **Leadership and Outreach Award** — **Alumni Association, IISER Mohali**
Awarded to one BS-MS graduate for leadership, efforts towards outreach and other extracurriculars.

2023 **Undergraduate Exchange Scholarship** — **RESOLV, Ruhr University Bochum**
Scholarship to pursue a 3 month research project in Germany; 1 of 7 students selected globally.

2020 **INSPIRE - Scholarship for Higher Education (SHE)** — **DST, Govt of India**
Five-year scholarship awarded to top 1% of Grade 12 graduates for higher education in scientific research.

Research Experience

2025 **Interfacial charge transfer kinetics study** — **Graduate RAship (Sept 2025 - Present)**
Indian Institute of Science Bangalore — Supervisor: Prof Naga Phani Aetukuri

Compiling data, literature review and theoretical calculations for a manuscript in preparation. Executing cycling-EIS-DRT tests to investigate Li/LLZO interface. Designing custom 3-electrode Li-ion cells.

2025 **Computational study of CF-π interactions** — **MS Thesis (Feb 2025 - March 2025)**
IISER, Mohali — Supervisor: Prof Angshuman Roy Choudhary

Isolated the stabilisation effect of weak F-bonding in fluorinated sp^2 molecules by modelling CF-π interactions using Gaussian09 on real molecules from the Cambridge Structural Database.

2024 **Acoustic and impedance analysis of solid electrolytes** — **MS Thesis (June 2024 - Jan 2025)**
Indian Institute of Science Bangalore — Supervisor: Prof Naga Phani Aetukuri

Established a broad-band EIS-DRT setup for solid electrolytes (LLZO, LPSCI), leading to quantifiable improvements in interfacial stability in half-cell and bilayer configurations. Evaluated improvements to LLZO synthesis using DRT, demonstrating limitations to achieving high density LLZO and highlighting the critical role of grain-boundary phases in bulk and interfacial electro-mechanics. Conducted theoretical and experimental investigations into probe design for acoustic analysis of solid-state cells.

2023 **Understanding bimetallic OER catalysis** — **Internship (May 2023 - July 2023)**
Max Planck Institute für Eisenforschung, Düsseldorf — Supervisor: Dr Martin Rabe

Unravelled the role of iron in bimetallic Ni-Fe catalysts for the Oxygen Evolution Reaction (OER) by study design and systematic physical (XPS) and electrochemical (CP) characterisation, subsequently coupling both via operando Raman spectroscopy. Attended the RESOLV summer school.

2022 **Low-temperature charge transport study** **Internship (May 2022 - July 2022)**
Indian Institute of Science, Bangalore Supervisor: Prof Naga Phani Aetukuri

Engineered hermetically sealing polymeric chambers through material simulation and iterative design and testing, enabling the first low-temperature charge transport measurements on mixed ionic-electronic organic transistors in an aqueous environment. Fabricated and electrochemically characterised Organic Electrochemical Transistors on interdigitated electrodes.

2021 **Simulating Li-Ion Batteries** **Remote Project (August 2021 - Sept 2021)**
Indian Institute of Technology, Delhi Supervisor: Dr Akhil Garg

Reading project with simulation work to set up the pseudo-2D model in COMSOL Multiphysics for calculating capacity loss in Li-ion cells based on SEI growth towards a large-model study.

Select Presentations

2025 **BS-MS Thesis Poster Presentation** **IISER-Mohali**
Poster - "Even Solid-State Batteries Need to Relax"

2024 **Solid State and Structural Chemistry Unit Day** **Indian Institute of Science**
Oral Presentation - "Using Impedance Spectroscopy to study interfaces in Solid-State Batteries"

2023 **RESOLV UEx Presentation** **Ruhr University Bochum**
Oral Presentation - "Understanding the mechanism behind Ni-Fe Bimetallic Catalysis in OER"

Skills

Electrochemical Analysis	Broadband EIS, DRT, KK, Cell Cycling, CV, CP/CA, CNLS Fitting
Materials Characterisation	Scanning Acoustic Microscopy (SAM), Raman, IR, UV-Vis, AFM-IR
Synthesis	Solid-state synthesis, Spin Casting, 3D Printing, Glove-box Fabrication
Computation & Data Analysis	COMSOL, Python, Julia, FORTRAN, Gaussian, CSD/CCDC
Software Environments	OriginPro, AutoCAD, Linux, LaTeX(preferred), MS Office

Relevant Coursework

Chemistry of Materials	Analytical Chemistry & Lab	Statistical Thermodynamics
Concepts in Nanomaterials	Molecular Spectroscopy	Numerical Chemistry
Electrochemistry	Main Group Chemistry	Electronics, Electromagnetism

Leadership Experience

Student Representative Council (2024-2025)
Represented ~250 peers as an elected student council member and academic liaison in administrative meetings.

Student Run Mess (2022-2025)
Directed the cooperative mess since its inception, serving as President of the first council. Designed its fiscal structure, constitution and operational policies, growing annual revenue to 4 Crore INR while supervising 20+ employees, managing a team of 14 council members and handling accounts, logistics and vendor negotiations.

Manthan Magazine (2021-2023)
Served as Junior Editor (2021-2022) and Managing Editor (2022-2023). Conceptualised and designed the institute's first student newspaper, heading design. Published inaugural issue viewable *here*.

References

Prof Naga Phani Aetukuri
Thesis and Internship Supervisor
Associate Professor, IISc
phani@iisc.ac.in

Dr Martin Rabe
Internship Supervisor
Group Leader, MPI SusMat
m.rabe@mpi-susmat.de

Prof Ujjal K. Gautam
Instructor and Thesis Evaluator
Associate Professor, IISER-M
ujjalgautam@iisermohali.ac.in

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