

AJINKYA SHINGOTE

Ph.D. Candidate | Physical & Materials Chemistry Investigating nanoscale light-matter interactions via single-particle optical spectroscopy to establish fundamental design principles for next-generation optoelectronic devices

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159 Stepan Chemistry, Notre Dame

Education

Ph.D. Chemistry Prof. Gregory Hartland	University of Notre Dame	2024-2029 (expected)
M.S. Chemistry Prof. Angshuman Nag	Indian Institute of Science Education and Research (IISER)	2023-2024
B.S. Chemistry Prof. Pramod Pillai	Indian Institute of Science Education and Research (IISER)	2019-2023

Research Experience

University of Notre Dame, Indiana, USA 2024-present

Fourier space optical imaging:

- Designed and constructed a custom Fourier-space optical imaging setup to map energy-momentum dispersion curves, enabling the quantification of exciton-plasmon coupling in hybrid nanostructures.
- Extracted and mathematically fitted line profiles from real-space microscopic images to determine polariton propagation lengths.
- Analyzed group velocity and propagation dynamics to calculate polariton dephasing times, providing critical insights into the coherence lifetimes of the system.
- Developed and executed electromagnetic simulations using COMSOL Multiphysics to model energy transfer pathways and radiation damping, providing a robust theoretical framework that validated experimental findings.

IISER Pune, Maharashtra, India

2023-2024

Thermal Evolution of the Structure and Luminescence of the Hybrid-Cation-Stabilized [(4AMTP)PbBr₂]₂PbBr₄ Layered Perovskite:

- Analyzed low-temperature (8–300 K) SCXRD and PXRD data to evaluate 2D perovskite phase behavior, proving complete phase-transition suppression and enhanced structural rigidity from hybrid A-site cation.
- Executed variable-temperature steady-state and time-resolved spectroscopy to map exciton dynamics, uncovering interplay between bright-dark exciton.
- Comparative structural analysis of hybrid versus conventional 2D perovskites was performed to elucidate the role of entropy of fusion (ΔS_{fus}) in thermal behavior, directly supporting the study "Entropy-Driven Reversible Melting and Recrystallization of Layered Hybrid Perovskites."

IISER Pune, Maharashtra, India

2022-2023

Co-doping Te⁴⁺ and Er³⁺ in Cs₂NaInCl₆ double perovskite for Short Wave Infrared (SWIR) emission:

- Optimized hydrothermal synthesis parameters for doped double perovskites to fine-tune material stoichiometry, successfully maximizing SWIR emission efficiency.
- Structurally characterized the samples using PXRD, ICPMS techniques to determine dopant site incorporation, doping percentages, and lattice distortion, establishing essential structure-property relationships for host-guest interaction.
- Conducted temperature (8–300 K) dependent photoluminescence excitation, emission, and lifetime measurements to elucidate the energy-transfer mechanisms driving SWIR emission.
- Fabricated a prototype phosphor-converted light-emitting diode (pc-LED) utilizing the optimized double perovskite phosphors, demonstrating practical proof-of-concept utility for SWIR optoelectronic devices.

Research Skills

- Expertise** with UV-visible spectrophotometer, low-temperature photoluminescence spectrophotometer, Time-Correlated Single Photon Counting (TCSPC) instrument and PXRD instrument
- Experience** in analytical techniques such as SCXRD, XRD, UV/Vis Spectroscopy, FESEM, EDS, TGA, and DSC

- **Expert** in glovebox usage and maintenance, low and high-temperature reactions, spin coating, high-temperature furnace operation
- **Familiar** with software such as VESTA, Mercury, APEX4, Origin, Chemdraw, HighScore, and FullProf
- Ability to work independently on multiple projects

Publications

1. Habibul Arfin, Radha Rathod, **Ajinkya Sundarnath Shingote**, K. R. Priolkar, Pralay K. Santra, and Angshuman Nag, Short-Wave Infrared Emissions from $\text{Te}^{4+}\text{-Ln}^{3+}$ (Ln: Er, Yb)-Codoped $\text{Cs}_2\text{NaInCl}_6$ Double Perovskites, **Chem. Mater.** **2023**, **35**, **17**, **7133–7143**
2. **Ajinkya Sundarnath Shingote**, Taniya Dutta, Parikshit Kumar Rajput, and Angshuman Nag, Thermal Evolution of the Structure and Luminescence of the Hybrid-Cation-Stabilized $[(4\text{AMTP})\text{PbBr}_2]_2\text{PbBr}_4$ Layered Perovskite, **Chem. Mater.** **2024**, **36**, **10**, **0897-4756**
3. Parikshit Kumar Rajput, Parashurama Salunkhe, Manmayuri Sarma, Meghasree Basu, Animesh Gopal, Aprajita Joshi, **Ajinkya Sundarnath Shingote**, Surajit Saha, Atikur Rahman, and Angshuman Nag, Entropy-Driven Reversible Melting and Recrystallization of Layered Hybrid Perovskites, **Small** **2024**, **2406735**

Conference

- 21st Annual Chautauqua workshop on Nonlinear Optics 2026 (Participant).
- Midwest Retreat for Pathways in Chemistry (MWRPC 2026) (Planning committee member)
- Emerging Materials 2023 (volunteer and participant).
- Low Dimensional Materials 2022 (Participant)

Academic achievements

- Ranked in the top 30 in Pune district in the Maharashtra State Scholarship Program.
- Passed with distinction in 10th and 12th standard.
- Qualified in numerous state-level examinations like MTSE, NTSE, and JEE.

Hobbies and interests

- Juggling, Bowling, Working out in gym.
- Reading books (psychology and personal development).
- Watching documentaries.