Laxmikant LP Pathade

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Education

Syracuse University **2013-2018**
Ph.D. in *Materials Chemistry* with Prof. Mathew M. Maye
Thesis: Design and Synthesis of Stainless-Steel Nanoparticles: Oxidation Behavior and Morphological Evolution

Institute of Chemical Technology, Mumbai (formerly UDCT/UICT) **2009-2013**
B.Tech. in *Organic Colorant Technology*; Minors in *Chemical Engineering*
Thesis Advisor: Prof. Prakash M. Bhate
Thesis : Employing Design of Experiment to Improve the Synthetic Yield of 1-chloro-4-nitro-anthraquinone

Work & Research Experience

Upper School Science Teacher (Chemistry) at Saint Edward's School **2018-present**

- Teach on-level, honors, and AP chemistry coursework.
- Manage a chemistry lab space and design coursework and co-curricular materials including research topics.
- Coordinate local science-fair & encourage students research; create research opportunities for students interested in STEM fields; collaborate with other science educators.
- Received a summer research award to develop labs focused on solids state chemistry, material science, and science research curriculum.

Graduate Researcher at Syracuse University **2013-2018**

- Investigated synthetic design of transition metal core/shell type nanoparticles (NPs) that exhibited *hollow internal microstructures*. This study of diffusion & oxidation behavior in transition metal NPs is funded by NSF.
- Successfully exploited our findings to improve corrosion resistance in alloys NPs and create truly *"stainless"* NPs.
- Published several peer reviewed journal articles, co-authored patents, and presented research in regional and national conferences. (listed below)
- Explored other research topics including - asymmetric internal voids in novel NP systems, sulfidation of Fe/Cr core/shell NPs, reaction monitoring using $CsPbX_3$ perovskites, ligand exchange, phase transfer, silica coating, & surface functionalization in magnetic NPs, & discrete dipole approximation routines to model electromagnetic absorption and scattering around various noble and transition metal NP geometries.
- As a graduate X-ray facility admin: trained new users on the diffractometer and the necessary safety protocols; coordinated user queue; collaborated with internal & external users for specialized sample prep & data analysis.maintained auxiliary chiller operations, repaired minor breakdowns, scheduled maintenance & inspections.

Graduate Teaching Assistant at Syracuse University **2013-2018**

- Developed 4 new lab modules to introduce advanced materials chemistry topics such as synthesis & properties of NPs. Topics include "*Synthesis of Cesium Lead Perovskite ($CsPbX_3$) nanocrystals*", "*Demonstration of Transmission Electron Microscope*", & "*Solid State Modeling & X-ray Diffraction*
- Supervised undergraduate trainees & summer *REU* researchers in the Maye lab.
- Received Graduate Teaching Assistant Mentor Award from the Syracuse University Graduate School in 2016 for outstanding mentorship service to the incoming STEM teaching assistants.

Publications

(4) "Alloying and Phase Transformation of Fe/FeNi Core/Alloy Nanoparticles at High Temperatures" *ChemRxiv*, **2021** (doi: 10.26434/chemrxiv-2021-zsnbm)

(3) Understanding the Oxidation Behavior of Fe/Ni/Cr and Fe/Cr/Ni Core/Alloy Nanoparticles." *J. Phys. Chem. C* **2016** (doi: 10.1021/acs.jpcc.6b06926)

(2) "Using Perovskite Nanoparticles as Halide Reservoirs in Catalysis and as Spectrochemical Probes of Ions in Solution." *ACS Nano* **2016** (doi: 10.1021/acsnano.6b00806)

(1) "The transformation of α -Fe nanoparticles into multi-domain FeNi–M3O4 (M=Fe, Ni) heterostructures by galvanic exchange." *J. Mater. Chem. C* **2015** (doi: 10.1039/c5tc00929d)

Selected Presentations

- "Understanding the Oxidation Behavior of Stainless Transition Metal Core/Alloy Nanoparticles." (Talk) Northeast Regional Meeting of the ACS, Binghamton, NY (**2016**)
- "Oxidation resistance interfaces in colloidal core/alloy nanoparticles" (Talk), ACS National Meeting, Philadelphia, PA (**2016**)
- "Synthesis and processing of core/alloy nanoparticles with stainless interfaces" (Poster), ACS National Meeting, Boston, MA (**2015**)

Research Recognition

- Rob Enslin, "Chemists Add Color to Chemical Reactions" May 10, 2016
  https://news.syr.edu/2016/05/chemists-add-color-to-chemical-reactions-81547/

Honors and Awards

- Morrison Waldrop Summer Research Stipend by Saint Edward's School **(Summer, 2022, 2019)**
- TA Mentor Award by the Graduate School at Syracuse University **(Fall, 2016)**
- Conference Travel Award, Department of Chemistry at Syracuse University **(2015, 2016)**
- Danve Family Foundation Award for Academic Excellence **(2007, 2013)**
- Navodaya Scholarship for 7 consecutive years (HRD Ministry, Govt. of India) **(2002-2009)**

Professional Activities

- **X-ray Facility Administrator** (2014-present)
  As a graduate facilities administrator, I ran day-to-day operations of the powder X-ray diffractometer (Bruker D8-Advance) at the X-ray facility in the chemistry department at Syracuse University. Please refer work experience section for details.
- **Peer reviewer for journals publishing in the field of Nanoscience.**
- **Member of Professional Societies**
  American Chemical Society (ACS) · Material Research Society (MRS) · Society of Dyers and Colourists, India

Technical Skills

- **Synthesis:** Nanoparticles (Transition and Noble Metals, Perovskites, Quantum Dots) · Air-free Techniques (Schlenk Line and Glovebox) · Microwave · Organic Lab work
- **Analytical methods:** Characterization using various spectroscopic and structural methods including powder and single crystal X-ray diffraction, Electron Microscopy (TEM, SEM, EDS, AFM), Computational Analysis (Discrete Dipole Approximation, familiar with FDTD)
- **Languages:** Python · Jekyll · HTML/Markdown · Familiar with C/C++, Fortran
- **Computer Misc.:** Linux · Wordpress/MAMP · git · LaTeX.· 3D-printing · Raspberry Pi