Laxmikant LP Pathade

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Education

Syracuse University **2013-2017**
PhD in *Materials Chemistry*
Research Advisor: Prof. Mathew M. Maye
Thesis Topic: "Design and Synthesis of Transition Metal Core/Shell Nanoparticles with Hollow Internal Microstructures and Corrosion Resistant Properties"

Institute of Chemical Technology, Mumbai (formerly UDCT/UICT) **2009-2013**
Bachelor of Technology in *Chemistry*; Minors in *Chemical Engineering & Organic Colorants*
Thesis Advisor: Prof. Prakash M. Bhate
Thesis Topic: "Improve the Synthetic Yield of 1-chloro-4-nitroanthraquinone, an Important Industrial Dyestuff Intermediate"

Work & Research Experience

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

- My doctoral research focuses mainly on the design & synthesis of transition metal core/alloy nanoparticles (CA-NPs) that exhibited uniquely *hollow internal microstructures*. This study of oxidation behavior in transition metal based CA-NPs is funded by a NSF-DMR grant. This structural property was further exploited to enhance their *corrosion resistance* and thus creating truly *"stainless"* nanoparticles.
- Published **6+** peer reviewed journal articles, co-authored **2** patents, and presented my work in regional and national conferences (∼**12** talks/posters). (Please see below)
- Other research topics include -
  - Asymmetric and Symmetric Internal Voids in Novel Fe/Ni CA-NPs as a Function of Feed Ratio
  - Multi-Layered Transition Metal Shell Deposition on α-Fe NPs
  - Ligand Exchange, Phase Transfer, Silica-coating, & amine-Functionalization of Magnetic CA-NPs
  - Synthesis & Characterization of Lead Halide based $CsPbX_3$ Perovskite Nanocrystals
  - Asymmetric Internal Voids in CA-NPs using Noble Metals
  - Sulfidation of Fe/Cr core/shell nanoparticles
  - Modeling Electromagnetic Absorption and Scattering around various Noble and Transition Metal Nanoparticle Geometries (e.g. ellipsoids, core/shell, rectangular solids, and finite cylinders) via Discrete Dipole Approximation (DDA) method.

Administrator at the X-ray Facility at Syracuse University **2014-present**

- As a graduate facility administrator, I oversee day to day operations of the powder X-ray diffractometer at Syracuse University's shared X-ray facility.
- Responsible for new user training, queue management, specialized sample prep & data analysis, instrument troubleshooting, Haskris/chiller upkeep, scheduling maintenance & regulatory inspections.
- As a part of my teaching assistant duties, I also taught a "Solid State Modeling and X-ray Diffraction" lab for chemistry honors students every fall.

Teaching Assistant at Syracuse University **2013-present**

- Taught General Chemistry and Honors General Chemistry (CHE 107-117, 129) courses at SU. My responsibilities included holding recitations & office hours, conducting labs, & reporting student progress.

- Developed new labs such as "*Synthesis of Cesium Lead Perovskite ($CsPbX_3$) nanocrystals*", "*Comparing Optical Property of Fluorescent Compounds using Spectrometers*", "*Demonstration of Electron Microscopy*", & "*Solid State Modeling & X-ray Diffraction*".
- Mentored several (<5) undergraduate researchers working in 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.

Industrial Internships

- Worked on a research project for a *Fortune 500* chemical company in major capacity. **2017**
- Interned at 2 medium-sized pigment-manufacturing plants in the industrial area near Mumbai, India. Observed unit operations of chemical engineering, manufacturing of reactive dyes and pigments, and prepared a report on manufacturing efficiency & recommendations on workplace safety. **2012**

Technical Skills

- **Chemical Synthesis:** Nanoparticles (Transition and Noble Metals, Nano-perovskites, Quantum Dots) ∘ Schlenk Line and Glovebox techniques ∘ Microwave ∘ Organic Lab work
- **Structural Characterization:** Powder and Single Crystal XRD (Currently work as facility admin)
- **Electron Microscopy:** TEM / HR-TEM (trained on 3 different JEOL TEMs; trained new users) ∘ EDS (Oxford Instruments Certification) ∘ STEM ∘ SEM ∘ AFM (Bruker Innova) ∘ Optical
- **Spectroscopy:** XPS/ESCA ∘ EDS ∘ NMR ∘ Raman ∘ AA ∘ Mass ∘ FTIR ∘ UV-Vis ∘ PL
- **Technical Misc.:** Magnetization in materials ∘ Cyclic Voltammetry ∘ DLS- ζ potential ∘ Ultracentrifuge ∘ Sputter Coater ∘ Spin coater ∘ Photolithography ∘ TGA ∘ DSC ∘ Vernier Modules ∘ Rotovap
- **Computational Analysis:** Discrete Dipole Approximation (DDA) ∘ Familiar with FDTD
- **Softwares**: Origin ∘ Plotly ∘ Datagraph ∘ Igor-Pro ∘ ImageJ ∘ ChemDraw ∘ Vesta ∘ TEMCON (JEOL) ∘ Digital Micrograph (Gatan) ∘ AZtec (Oxford Instruments) ∘ Bruker Diffrac.Suite ∘ CasaXPS ∘ QUASES ∘ Adobe Illustrator ∘ Corel-Draw ∘ Maya basics
- **Languages:** Python ∘ Jekyll ∘ HTML/Markdown ∘ Familiar with C/C++, Fortran
- **Computer Misc.:** Raspberry Pi ∘ 3D-printing ∘ Linux ∘ Wordpress/MAMP ∘ LaTeX. ∘ git

Publications

(7) Laxmikant Pathade, Rahiem Davon Slaton, Tennyson Doane, Mathew M. Maye "Corrosion Resistance Performance of Fe/CrNi Core-Alloy Nanoparticles in Solution and as Thin-Films." (To be submitted, 2017)

(6) Tennyson Doane, Laxmikant Pathade, Mathew M. Maye "Understanding Alloying and Phase Transformation in FeNi Core Alloy Nanoparticles at High Temperatures." (To be submitted, 2017).

(5) Laxmikant Pathade,¶ Rahiem Davon Slaton,¶ Tennyson Doane,¶ Mathew M. Maye "Void Formation and Oxidation Resistance in FeNi Core/Alloy Nanoparticles. (submitted, **2017**)

(4) Tennyson Doane, Kevin Cruz, Kayla Ryan, Laxmikant Pathade, Mathew M. Maye "Colorimetric Monitoring of a Chemical Reaction using Perovskite Nanoparticles as Spectrophotometric Probes" (in press, ChemComm, 2017.)

(3) Tennyson Doane, Kayla Ryan, Laxmikant Pathade, Kevin Cruz, Huidong Zang, Mircea Cotlet, Mathew M. Maye "Using Perovskite Nanoparticles as Halide Reservoirs in Catalysis and as Spectrochemical Probes of Ions in Solution." ACS Nano 2016, 10 (6), 5864–72 (doi: 10.1021/acsnano.6b00806)

(2) Laxmikant Pathade, Tennyson Doane, Rahiem Davon Slaton, Mathew M. Maye "Understanding the Oxidation Behavior of Fe/Ni/Cr and Fe/Cr/Ni Core/Alloy Nanoparticles." J. Phys. Chem. C 2016, 120 (38), 22035–44 (doi: 10.1021/acs.jpcc.6b06926)

(1) Slaton, Rahiem Davon, In-Tae Bae, Patrick S. Lutz, Laxmikant Pathade, Mathew M. Maye "The transformation of α -Fe nanoparticles into multi-domain FeNi–M3O4 (M=Fe, Ni) heterostructures by galvanic exchange." J. Mater. Chem. C 2015, 3 (24), 6367–6375 (doi: 10.1039/C5TC00929D)

Patents

- Mathew M. Maye, Rahiem Davon Slaton, Laxmikant Pathade, Tennyson Doane "COMPOSITIONS OF NANOPARTICLES WITH RADIAL GRADIENTS AND METHODS OF USE THEREOF" US Provisional Patent, Application #62/257,665, Filed November 19, 2015.
- Tennyson Doane, Mathew M. Maye, Laxmikant Pathade, Kayla Ryan "SYSTEM AND METHODS FOR VISUALIZING CHEMICAL REACTIONS IN REAL TIME" US Provisional Patent, Application #62/231,318, Filed September 02, 2015.

Selected Presentations

- "Understanding the Oxidation Behavior of Stainless Transition Metal Core/Alloy Nanoparticles." (Talk) Northeast Regional Meeting of the ACS, Binghamton, NY (October, 2016)
- "Oxidation resistance interfaces in colloidal core/alloy nanoparticles" (Talk), American Chemical Society National Meeting, Philadelphia, PA (Aug. 2016)
- "Oxidation behavior of stainless core/alloy nanoparticles" (Poster), American Chemical Society National Meeting, Philadelphia, PA (Aug. 2016)
- "Corrosion Resistant Surfaces via Transition Metal Nanoparticle Chemistry" (Talk) Three Minute Thesis competition, Syracuse University. (Feb. 2016)
- "Synthesis and processing of core/alloy nanoparticles with stainless interfaces" (Poster), American Chemical Society National Meeting, Boston, MA (Aug. 2015)
- "Synthesis and processing of core/alloy nanoparticles with stainless interfaces" (Talk), Northeast Regional Meeting of the American Chemical Society, Ithaca, NY (June 2015)
- "A solution to Industry defined problem: To recover coconut fatty acid monoethanolamine (MEA) from 3percent MEA mixture" (Talk), Young Innovators Choice Competition, ICT, Mumbai. (2012)
- "Synthesis and Applications of Color Formers" (Talk), Institute of Chemical Technology, Mumbai. (2012)
- "Sorbitol & sorbitan esters, and their ethoxylated derivatives" (Talk), Institute of Chemical Technology, Mumbai. (2012)

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

- 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)**
- 2nd place Young Innovators' Choice Competition at Institute of Chemical Technology **(2012)**

- Dow / Sudarshan Undergraduate Research Position (Summer REU) **(2011)**
- Ranked Regionally in National Science Olympiad, India (NSO-SOF) **(2006)**
- 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 run 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. My responsibilities include maintenance, new user training, queue management, data analysis, specialized sample analysis, minor instrument troubleshooting and collaboration with users from external departments.
- **Peer reviewer for journals publishing in the field of Nanoscience.**
  ∘ Nanoscale (RSC) ∘ Journal of Physical Chemistry (ACS) ∘ Journal of Alloys and Compounds
- **Member of Professional Societies**
  ∘ American Chemical Society (ACS) ∘ Indian Chemical Society (ICS) ∘ Society of Dyers and Colourists (SDC-India)

Outreach Activities & Services

- Served as a special awards judge for ASM Material Education Foundation at the Central New York Science & Engineering Fair, SRC Arena at Onondaga Community College, Syracuse, NY (supported by Lockheed Martin, SRC Inc., Bristol-Myers Squibb, Saab, NASA, NYS Space Grant, and the Technological Association of Central NY) (March, 2017)
- Maker-hall volunteer at the event hosted by Technology Alliance of Central New York at the Annual Dr. MLK Jr. Community Celebrations, Nottingham High School, Syracuse, NY (January, 2016)
- Part of student committee at the National Symposium on Functional Application of Colorants (NSFAC), held at Institute of Chemical Technology, Mumbai (2011 & 2012)
- Assistant to the sport secretary during SPORTSAGA, annual sports festival at Institute of Chemical Technology, Mumbai (2012)
- Logistics and Resource mobilization department, co-organizer for Table-Tennis competition, Youth Festival, EXERGY, Institute of Chemical Technology, Mumbai (2010)