

LAXMIKANT LP PATHADE

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EDUCATION

Syracuse University

2013-2018

Ph.D. Candidate in *Materials Chemistry* with Prof. Mathew M. Maye

Thesis: Internal Morphology & Corrosion Resistance in Stainless Steel Nanoparticles

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

Materials Chemistry Intern at Pelitex Inc.

2017

- Executed a synthesis scale-up & technology transfer project for a *Fortune 500* chemical company in record time.
- Designed new synthesis and safety protocols for materials synthesis at increased scales and improved waste recycling.
- Collaborated with researchers to optimize the silica shell coating to improve hydrophilicity of products.

X-ray Facility Administrator at Syracuse University

2014-present

- Trained new users on the diffractometer and 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 & regulatory inspections.
- Taught a “Solid State Modeling and X-ray Diffraction” lab for chemistry honors students every fall, as part of my teaching assistant duties.

Graduate Researcher at Syracuse University

2013-present

- 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 a NSF.
- Successfully exploited our findings to improve *corrosion resistance* in these NPs and create truly “*stainless*” nanoparticles.
- Executed a synthesis scale-up & technology transfer project for a *Fortune 500* chemical company in record time.
- Published **6** peer reviewed journal articles, co-authored **2** patents, and presented research in several professional conferences.
- Explored other research topics including - asymmetric internal voids in novel NP systems, ligand exchange- phase transfer- silica coating- & surface functionalization- in magnetic NPs, sulfidation of Fe/Cr core/shell NPs, reaction monitoring using CsPbX₃ perovskites, & discrete dipole approximation routines to model electromagnetic absorption and scattering around various noble and transition metal NP geometries.

Teaching Assistant at Syracuse University

2013-present

- Received Graduate Teaching Assistant Mentor Award from the Syracuse University Graduate School in 2016 for outstanding mentorship service to the incoming STEM teaching assistants.
- Supervised undergraduate trainees & summer *REU* researchers in the Maye lab.

- 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*”, “*Comparing Optical Property of Fluorescent Compounds using Spectrometers*”, “*Demonstration of Transmission Electron Microscope*”, & “*Solid State Modeling & X-ray Diffraction*”

Internships

- Interned at 2 medium-sized pigment-manufacturing plants in Mumbai industrial area. Reviewed unit operations of chemical engineering and authored a report on manufacturing efficiency & workplace safety. **2012**
- Summer research intern at ICT Mumbai; performed systematic study to synthesize an organic dyestuff intermediate. **2011**

TECHNICAL SKILLS

- **Synthesis:** Nanoparticles (Transition and Noble Metals, Perovskites, Quantum Dots) · Air-free Techniques (Schlenk Line and Glovebox) · Microwave · Organic Lab work
- **Structural Characterization:** Powder and Single Crystal X-ray Diffraction (Facility Manager)
- **Electron Microscopy:** TEM equipped with EDS & STEM detectors (full user on 3 different JEOL TEMs; trained new users) · SEM (JEOL IT100LA) · EDS Certification from Oxford Instruments · AFM (Bruker Innova)
- **Spectroscopy:** X-Ray Photoelectron Spectroscopy (XPS/ESCA) · NMR · Mass-Spec · FTIR · UV-Vis · Photoluminescence (PL)
- **Technical Misc.:** Thermo-gravimetric Analysis (TGA) · Differential Scanning Calorimetry (DSC) · Magnetization in materials · Cyclic Voltammetry · Ultracentrifuge · Spin coater · Sputter coater · Dynamic Light Scattering (DLS) & ζ -potential · Vernier Modules
- **Computational Analysis:** Discrete Dipole Approximation (DDA) · Familiar with FDTD
- **Softwares:** Origin · Plotly · ImageJ · ChemDraw · Vesta · TEMCON (JEOL) · Digital Micrograph (Gatan) · AZtec (Oxford Instruments) · Bruker Diffrac.Suite · CasaXPS · Illustrator · Corel-Draw · Maya (basics) · Tinkercad
- **Languages:** Python · Jekyll · HTML/Markdown · Familiar with C/C++, Fortran
- **Computer Misc.:** 3D-printing · Raspberry Pi · Linux · Wordpress/MAMP · git · L^AT_EX

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) Laxmikant Pathade, ¶ Rahiem Davon Slaton, ¶ Tennyson Doane, ¶ Mathew M. Maye “Void Formation and Oxidation Resistance in FeNi Core/Alloy Nanoparticles. (To be submitted, **2017**)
- (5) Tennyson Doane, Laxmikant Pathade, Mathew M. Maye “Understanding Alloying and Phase Transformation in FeNi Core Alloy Nanoparticles at High Temperatures.” (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) 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)
- (2) 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/acs.nano.6b00806)
- (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 (2016)
- “Oxidation resistance interfaces in colloidal core/alloy nanoparticles” (Talk), ACS National Meeting, Philadelphia, PA (2016)
- “Oxidation behavior of stainless core/alloy nanoparticles” (Poster), ACS National Meeting, Philadelphia, PA (2016)
- “Corrosion Resistant Surfaces via Transition Metal Nanoparticle Chemistry” (Talk) Three Minute Thesis competition, Syracuse University (2016)
- “Synthesis and processing of core/alloy nanoparticles with stainless interfaces” (Poster), ACS National Meeting, Boston, MA (2015)
- “Synthesis and processing of core/alloy nanoparticles with stainless interfaces” (Talk), Northeast Regional Meeting of the ACS, Ithaca, NY (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), ICT, Mumbai (2012)
- “Sorbitol & sorbitan esters, and their ethoxylated derivatives” (Talk), ICT, 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. Please refer work experience section for details.
- **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, and the Technological Association of Central NY) **(2017)**
- volunteered at the Maker-hall event hosted by Technology Alliance of Central New York at the Annual Dr. MLK Jr. Community Celebrations, Nottingham High School, Syracuse, NY **(2016)**
- Student committee Member at the National Symposium on Functional Application of Colorants (NSFAC), held at ICT, Mumbai **(2011 & 2012)**