

TEJASHRI PATIL

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U.S. Work Authorization: No current or future employer sponsorship required.

Summary

Experimental Ph.D. researcher in mechanical engineering with seven (7) years' experience specializing in particle formation and materials characterization. Four first author publications detailing a world-first phenomenon, the emission of ammonium nitrate nanoparticles from ammonia combustion systems. Development of experimental protocols using FTIR, TEM-EDS, Raman spectroscopy and particle sampling techniques. Cross functional team member at Applied Materials collaborating with material scientists, process engineers, systems engineers and technicians to understand ion implantation defect causation.

Publications

1. **Patil, T.**, Reggeti, S., Kane, S. P., Northrop, W. F. "Experimental Investigation of Particulate Emissions From an Ammonia-Fueled Internal Combustion Engine." *ASME J. Eng. Gas Turbines Power*, 2025. ([Link](#))
2. **Patil, T. S.**, Voris, A., Kane, S., Northrop, W. "Ammonium nitrate nanoparticle emissions from ammonia-fueled internal combustion engines." *Journal of Aerosol Science*, 2025. ([Link](#))
3. **Patil, T. S.**, Goertemiller, C.G., Northrop, W. "Ammonium Nitrate Particle Emissions from Ammonia-fueled Turbulent Swirl and Cyclone Combustors" *Journal of Ammonia Energy*, 2026. ([Link](#))
4. **Patil, T. S.**, Goertemiller, C.G., Northrop, W. F., Ammonium Nitrate Particle Formation from Laminar Premixed Ammonia-Hydrogen-Air Flames, *Proceedings of the Combustion Institute*, 2026. ([Link](#))

Awards

- Best Paper - ICE Forward 2024
- Best Paper - Symposium on Ammonia Energy (SoAE)'25 – Invited Plenary Speaker at SoAE'26 in Chile

Experience

Particle Science Co-op - Applied Materials

February 2026 – Present

- Investigated defect formation mechanisms in semiconductor processing involving dopant ion implantation.
- Supporting AMAT-Entegris collaboration to study and reduce particle transfer from platen to wafer.
- Performed TRIDYN simulations to study ion-material interactions, evaluating the impact of inert species on silicon, graphite and SiC to identify material degradation behavior based on ion fluence and energy.
- Executed design of experiments in collaboration with cross-functional teams to leverage experimental results to maximize the lifespan of the implantation process chamber graphite liners.
- Prepared and processed material samples for surface morphology characterization and defect analysis.
- Operated KLA SP7 metrology tool to prescan and postscan the defects.
- Presented wafer implantation simulation and analytical results to senior leadership.

Graduate Research Assistant - University of Minnesota

Sept. 2022 - Present

Key Scientific Contributions

- Identified novel ammonium nitrate nanoparticle emission phenomenon in first-in-world NH₃ combustors and engines.
- Correlated particle size distribution, morphology, and chemical composition using analytical tools.
- Established particle nucleation mechanism by correlating thermal processing parameters, precursor concentrations and particle size distributions.
- Identified particle growth by heterogeneous condensation mechanisms using TiO₂ seed particles.
- Presented research findings at international conferences including Combustion Institute, ASME ICE Forward and Symposium on Ammonia Energy.

Experimental Particle Characterization Research

- Designed and built SI engine, premixed laminar, and turbulent flame experimental setups for particle characterization from combustion of ammonia (NH₃) - hydrogen (H₂).
- Integrated gas delivery system for corrosive ammonia and explosive hydrogen gases, including mass flow controllers, valves, sampling tubes, fittings, and sensors.

- Partnered with purchasing and manufacturing resources to facilitate on-time procurement.
- Independently developed two stage dilution sampling system to accurately quantify ammonium nitrate submicron particle size distribution using scanning mobility particle sizer (SMPS).
- Conducted particle deposition using impactor; and TEM-EDS, FTIR, Raman, and XPS analysis.
- Measured gaseous emissions including NH₃, and NO_x using FTIR spectrometer.
- Conducted tandem differential mobility analyzer reactor experiments to evaluate particle hygroscopic growth and diameter change for varied residence time and temperature.
- Built and instrumented gasoline direct injection (GDI) engine to measure particulate and BTEX emissions measurement during cold start operation; setup of exhaust handling system, engine heat exchange system, emissions measurement instruments (FTIR, GC, Micro Soot Sensor, SMPS and Engine Exhaust Particle Sizer), and NI DAQ-LabView data acquisition.
- Devised an activated charcoal adsorption tube sampling system for measuring the BTEX emissions from GDI engine and delivered results to collaborators from Hormel Institute for the in-situ mice exposure study.
- Optimized experimental setups to leverage existing hardware in conjunction with conventionally machinable sampling hardware to optimize the use of research funding.
- Mentored three new students: taught basic lab skills, instrument operation, culture of lab safety, publication and conference opportunities.

Product Systems Design Engineer - Cummins India

July 2019 - July 2022

- Supported integration and launch of first-to-market BS-VI compliant heavy-duty turbocharger.
- Designed casting and machined turbocharger components including compressor, turbine, impeller, bearing housing with focus on performance, manufacturability, structural integrity and customer requirements for Cummins B6.7 engine during prototype concept production phase.
- Applied ASME Y14.5 to create drawings, DFMA guidelines, dimensional variation analysis, and PLM workflows from concept through manufacturing release production phases after drawing quality reviews.
- Collaborated cross functionally with product engineering, CFD, FEA, validation, and manufacturing teams to iterate component designs and meet technical requirements.
- Performed CFD analysis of compressor stages to evaluate efficiency, pressure ratio, and flow behavior.
- Performed FEA analysis of structural oil pan to assess stresses and integrity under various load conditions.
- Used Gantt chart to plan, track, and report progress on projects.
- Communicated design specifications, drawing interpretations across teams.

Research Intern - 512 Army Base Workshop, India

April 2017 - May 2018

- Rubber compounding - Developed trade secret rubber material formulations for enhanced durability.
- Mixed the compound including base polymer and additives using two roll rubber mill.
- Performed root cause analysis based on defect categorization of tracked vehicle rubber wheels.
- Optimized manufacturing processes through iterative testing and validation to yield near zero defects.

Education

- University of Minnesota - MS & PhD Mechanical Engineering
MS Graduation: May 2025 • GPA: 3.37/4.00
- Savitribai Phule Pune University, India - BE Mechanical Engineering

PhD Expected: August 2026

May 2019

Leadership & Service

Vice Chair - ASME Student Section

June 2016 – May 2018

- Led committee operations, organized technical events/workshops, speaker sessions for 300+ students, coordinated logistics, and mentored junior members.

Technical skills

Analytical Material Characterization: TEM-EDS, FTIR, Raman spectroscopy, XPS, GC

Particle & Experimental Systems: SMPS, EEPS, MOUDI, aerosol transport systems

Engineering & Analysis: MATLAB, Creo, SolidWorks, AutoCAD, DOE, TRIDYN, ANSYS CFX, ANSYS Workbench

Presentation: Microsoft Word, Excel, and PowerPoint, LaTeX, Verbal and written communication

Fabrication: Manual lathe, two roll mixer, tooling selection, wrenches, gauges, grinders, tap.