

SRESHTHA SINHA MAJUMDAR

Postdoctoral Research Associate at Oak Ridge National Laboratory
National Transportation Research Center (NTRC)

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SKILL SUMMARY

- Innovative Chemical Engineer with 7+ years of demonstrated competence in emissions control catalysis, catalyst characterization, reactor design and reaction engineering
- Expertise in synthesis and development of emissions control catalysts, evaluation on micro- and bench-scale flow reactors, characterization using Gas Chromatography (GC), Mass Spectrometry (MS), X-ray Diffraction (XRD), X-ray Photoelectron Spectroscopy (XPS), Scanning Electron Microscopy (SEM), Infra-red (FTIR) Spectroscopy, and Electron Paramagnetic Resonance (EPR) along with **diagnostics expertise** gained over 7+ years of successfully driving industry and U.S. government sponsored research projects
- Exceptional communication and presentation skills realized through the dissemination of key research findings via high impact factor peer-reviewed journal publications, multiple presentations at renowned technical conferences, and regular cross-functional reviews with industry and government sponsors
- Outstanding attention to detail and ability to quickly master the technical skills necessary to drive new projects
- Award-winning supervision and implementation of safety protocols in university as well as national laboratory research facilities
- Efficient and versatile experimentalist with the ability to contribute independently without supervision, as well as collaborate with teams on challenging assignments in corporate as well as academic environments

EDUCATION

Doctor of Philosophy (Ph.D.)	Chemical Engineering	The Ohio State University	2016
Bachelor of Engineering (B.E)	Chemical Engineering	University of Mumbai	2007

RESEARCH EXPERIENCE

National Transportation Research Center (NTRC), Oak Ridge National Laboratory (2016- present)

Postdoctoral Research Associate (November 2016-April 2019); R&D Associate Staff (May 2019- present)

- **Primary technical contributor on multiple research investigations** funded by Department of Energy to explore, develop, and characterize novel catalytic materials through the planning and execution of advanced bench-scale flow reactor experiments
- **Successfully performed project management responsibilities** including writing monthly/quarterly/annual reports, contributing to annual review presentations, and communicating key results to project teams, program stakeholders and funding sponsors in an effective and timely manner
- **Executed a detailed study on the potential impact of novel fuel components on vehicle emissions** by designing and conducting fuel light-off experiments on hydrothermally-aged commercial three-way catalysts using a LabVIEW-controlled bench-scale flow reactor system
- **Investigated and quantified the adsorption-desorption properties** of industrially relevant low-temperature adsorber materials to facilitate the modelling of passive NO_x adsorbers
- **Evaluated the performance** of novel low-temperature methane oxidation catalysts on a micro-reactor system
- **Established and documented guidelines/best practices** to set-up and perform experiments on bench-scale flow reactor systems
- **Designed a unique vapor delivery system protocol** to mitigate bubble formation and consequently ensure steady flow of liquid fuel during experiments
- **Troubleshooted and maintained mission-critical analytical equipment** such as MKS FTIR, Bronkhorst Vapor Delivery Module and Pfeiffer Spaci-mass spectrometer to deliver optimum instrument functionality at all times

Department of Chemical and Biomolecular Engineering, The Ohio State University (2011- 2016)

Graduate Associate; Heterogeneous Catalysis Research Group; Doctoral Advisor: Prof. Umit S. Ozkan

- **Collaborated with Caterpillar Inc.** on the development of an aftertreatment system for lean-burn engines
- **Spearheaded the Catalytic Emission Control team** by formulating multi-year testing roadmaps, devising experiments, analyzing and reviewing measured data cross-functionally on a regular basis
- **Enhanced the sulfur tolerance and hydrothermal stability** of the catalytic system by synthesizing robust selective catalytic reduction and oxidation catalysts using **sol-gel** and **wet impregnation** techniques and conducting time-on-stream catalyst performance tests under simulated engine-exhaust conditions
- **Developed a catalytically active wash-coat** by incorporating different binders into the catalyst to enhance the adhesive properties of the powdered catalyst, exploring the impact of binder addition on catalytic activity, and tailoring the wash-coating technique to maximize the efficiency of the aftertreatment catalytic scheme
- **Devised an innovative process to wash-coat cordierite monolith cores** that retains the catalytic properties of the wash-coat to reduce NO_x emissions while improving adhesion to the monolith core walls

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- **Designed and built advanced reactor systems** to conduct activity tests and kinetic studies on catalysts; in addition to characterization tests to investigate the underlying physics of catalyst performance
- **Owned and maintained** a chemiluminescence NO-NO₂-NO_x Analyzer, Gas Chromatograph, Quadrupole Mass Spectrometer, Gas Chromatograph-Mass Spectrometer (GC-MS), and Automated Characterization Instrument; while **diagnosing and repairing associated malfunctions** to facilitate laboratory operations

INDUSTRY EXPERIENCE

Johnson Matthey Chemicals India Pvt. Ltd.	2009-2010	Sales and Marketing	Sales Officer
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- Contributed to new business development by communicating client requirements in terms of reaction type, process conditions, solvents used, and poisons present to internal research and development teams; and ultimately coordinating the effort to deliver relevant, top-quality chemical samples to client locations
- Managed client accounts by syncing with multiple internal divisions at Johnson Matthey to plan, schedule, and manufacture catalysts as per customer requirements

Wipro Technologies Ltd.	2007-2009	Testing Services	Project Engineer
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- Developed scripts to test various modules on the SAP platform to ensure seamless functionality and operation at the BP Offshore Development Center in the Energy and Utilities vertical
- Developed critical workflows on the Oracle platform for testing at the SuperValu Offshore Development Center

LEADERSHIP EXPERIENCE

Primary Safety Officer, Ozkan Laboratory (2014- 2016)

- Supervised and enforced laboratory safety practices within a dynamic research group of 16+ scientists
- Regularly maintained and updated the Chemical Hygiene Plan (CHP) for annual audits by the Department of Environmental Health and Safety (EHS) at The Ohio State University
- Resolved safety issues in the department by brain-storming and implementing possible solutions in collaboration with representatives from other research groups in the Department of Chemical and Biomolecular Engineering
- Conducted seminars to facilitate key discussions on safe laboratory practices, while inviting insightful recommendations, many of which were subsequently adopted by other research groups

Mentorship Experience (2012- present)

- Successfully mentored a Ph.D. candidate and a Postdoctoral Researcher at Oak Ridge National Laboratory while driving an extensive effort to provide training in FTIR operation to accelerate new research initiatives
- Coached 2 doctoral students and 4 undergraduate researchers in the areas of catalyst preparation, characterization, and performance evaluation at The Ohio State University

AWARDS

- **Exceptional Effort Award** for attention to laboratory safety, ETSD, Oak Ridge National Laboratory (2017)
- **2016 Dean's List Certificate** to Ozkan Group for perfect score on EHS safety inspection, OSU (2016)
- **Kokes Award**, 24th North American Catalysis meeting, Pittsburgh (2015)
- **Best Safety Practices Award (2015) and (2016)** to Ozkan Group as Primary Safety Officer, OSU (2014-2016)

PUBLICATIONS

1. "Reactivity of Novel High-performance Fuels for Control of Spark-ignition Engine Emissions", **S.S Majumdar**, J. A. Pihl, T. J. Toops: *Submitted to Applied Energy* (2019).
2. "Development of a Cold Start Fuel Penalty Metric for Evaluating the Impact of Fuel Composition Changes on SI Engine Emissions Control", J. A. Pihl, J. F. Thomas, **S. S. Majumdar**, S. Huff, B. West, T. J. Toops: SAE International (2018).
3. "Effect of alumina incorporation on the sulfur tolerance of the dual-catalyst aftertreatment system for reduction of nitrogen oxides under lean conditions", **S. S. Majumdar**, A.-M. Alexander, P. Gawade, G. Celik, U.S. Ozkan: *Catalysis Today*, 320 (2019), 204-213.
4. "Effect of high-temperature on the swellable organically-modified silica (SOMS) and its application to gas-phase hydrodechlorination of trichloroethylene", H. Sohn, G. Celik, S. Gunduz, **S. S. Majumdar**, S. L. Dean, P. L. Edmiston, U. S. Ozkan: *Applied Catalysis B: Environmental*, 209 (2017), 80-90.
5. "Incorporation of binder during sol-gel preparation of Pd-based sulfated zirconia for reduction of nitrogen oxides under lean-burn conditions: Effect on activity and wash-coating characteristics", **S. S. Majumdar**, G. Celik, A.-M. Alexander, P. Gawade, U.S. Ozkan: *Applied Catalysis B: Environmental*, 202 (2017), 134-146.
6. "Investigation of the effect of alumina binder addition to Pd/SO₄²⁻-ZrO₂ catalysts during sol-gel synthesis", **S. S. Majumdar**, G. Celik, U.S. Ozkan: *Industrial & Engineering Chemistry Research*, 55 (2016), 11445-11457.