**Jacob Smith**

Center for Nanophase Materials Science

Oak Ridge National Laboratory

Post-doctoral Researcher

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**RESEARCH INTERESTS**

* In situ transmission electron microscopy (TEM), with experience performing atmospheric, liquid, cryogenic, and heating experiments.
* Implementation of algorithmic microscope control to overcome conventional user limitations and improve data quality.
* Simulation, algorithmic, and machine-learning assisted data analysis and reconstruction.

**EDUCATION**

2023 Ph.D Materials Sci. & Eng. North Carolina State University

2018 B.A. Mechanical Engineering North Carolina State University

**RESEARCH POSITIONS**

2023 – Present Postdoctoral Research Associate Oak Ridge National Laboratory

 PI: Miaofang Chi

2022 – 2023 Graduate Student Researcher Oak Ridge National Laboratory

 Co-PI’s: Miaofang Chi & Guannan Zhang

2019 – 2023 Graduate Research Assistant North Carolina State University PI: Wenpei Gao

2019 Summer Research Assistant North Carolina State University

 PI: Yuntian Zhu

2017 – 2018 Undergraduate Research Assistant North Carolina State University

 PI: Afsaneh Rabiei

**CURRENT PROJECTS**

* Solid State Platinum Precursor Chemistry Investigated via In Situ STEM
* Cryogenic 4D-STEM Distortion Correction
* Dynamically Sampled and Compressively Sensed 4D-STEM for Beam Sensitive Applications
* Heterogeneous Platinum Metal Oxide Sintering Dynamics Studied via In Situ STEM

**NOTABLE TECHNICAL EXPERTISE**

In Situ Transmission Electron Microscopy

Transmission Electron Microscopy Data Simulation

Python and MATLAB Scripting

Emission Control Catalysis

**FELLOWSHIPS**

Oak Ridge National Laboratory Graduate Opportunities Fellowship via the Office of Advanced Scientific Computing Research

North Carolina State University Provost’s Doctoral Fellowship

**AWARDS**

2023 M&M Poster – 1st Place

**PUBLICATIONS**

Smith, J. Sawant, K. et al. *Disproportionation Chemistry in K2PtCl4 Visualized at Atomic Resolution Using Scanning Transmission Electron Microscopy*, Science Advances, 2024

Smith, J. Huang, Z. Gao, W. Zhang, G. Chi, M. *Atomic Resolution Cryogenic 4D-STEM Imaging via Robust Distortion Correction*, ACS nano, 2023

Sodpiban, O., Smith, J., et al., *Catalysts Prepared from Atomically Dispersed Ce(III) on MgO Rival Bulk Ceria for CO Oxidation*, ACS Applied Materials & Interfaces, 2023

Zhao, K., Smith, J., et al., *Lithium carbonate-promoted mixed rare earth oxides as a generalized strategy for oxidative coupling of methane with exceptional yields*, Nature Communications, 2023

Stone, M., Smith, J., et al., *Ceria incorporation in sinter-resistant platinum-based catalysts*, ACS Catalysis, 2023

Ni, H., Smith, J., et al., *Quantifying Atomically Dispersed Catalysts Using Deep Learning Assisted Microscopy*, ACS Nano Letters, 2023

Smith, J. Wang, S. Eldred, T. DellaRova, C. Gao, W. *Characterization of nanomaterials dynamics with transmission electron microscope,* Encyclopedia of Nanomaterials, 2022

Wang, S. Eldred, T. Smith, J. Gao, W. *AutoDisk: Automated Diffraction Processing and Strain Mapping in 4D-STEM*, Ultramicroscopy, 2022

Rajeev, G. Witharamage, C. Christudasjustus, J. Smith, J. Gao, W. *Corrosion Behavior of an In-Situ Consolidated Nanocrystalline Al-V Alloy,* Nature Materials Degradation, 2022

Su, L., Smith, J., et al., *Visualizing the Formation of High-Entropy Fluorite Oxides from an Amorphous Precursor at Atomic Resolution*, ACS Nano, 2022

Eldred, T. Smith, J. Gao, W., *Polarization fluctuation of BaTiO3 at unit cell level mapped by four-dimensional scanning transmission electron microscopy*, Journal of Vacuum Science & Technology, 2021

Narayan, J. Joshi, P. Smith, J. et al., *Q-carbon as a new radiation-resistant material*, Carbon, 2021

**PRESENTATIONS**

Duke University – (Invited)

 Machine Learning and Data Processing for In Situ TEM

MRS Spring 2023

Smith, J. et al., *Compressive Sensing for 4D-STEM Imaging*

National University of Singapore – (Invited)

 In Situ Catalyst Synthesis at the Atomic Level

McMaster In Situ Workshop 2022

Smith, J. Gao, W., *Atomistic Dynamics of Disorder to Order Transitions Visualized by Computer Stabilized In Situ Electron Microscopy*

M&M 2022 Presentations

Smith, J. Gao, W, *Atomistic Reaction Kinetics and Chemistry Revealed using In Situ STEM*

Smith, J. et al., *Correcting Scan Distortions in Cryogenic 4DSTEM Acquisitions using Affine Transformations*

Smith, J. et al., *Data Correction for 4D-STEM Data Acquired at Cryogenic Conditions*

M&M 2021 Presentations

Smith, J. Gao, W. *Phase Transition and Atomic Scale Dynamics in Chemical Reaction Revealed in the Solid State by Electron Microscopy*

Wang, S. Eldred, T. Smith, J. Gao, W. *Automatic Diffraction Analysis and Lattice Fitting for Convergent-Beam Electron Diffraction Patterns in 4D-STEM*

Eldred, T. Smith, J. Funni, S. Dickey, E. Gao, W. *mapping Polarization of Perovskite Oxides across Scales Using 4D STEM with Improved Spatial Resolution*

ACS 2021 Fall Presentation

Smith, J. Gao, W., *Atomic resolution electron microscopy of solid-state phase transformations and chemical reduction*

**REFERENCES**

Dr. Wenpei Gao

Associate Professor

Shanghai Jiao Tong University

gaowenpei@sjtu.edu.cn

Relationship: Doctoral Advisor

Dr. Miaofang Chi

Distinguished Scientist

Oak Ridge National Laboratory – Center for Nanophase Materials Sciences

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Relationship: Oak Ridge National Laboratory Co-host

Dr. Guannan Zhang

Senior Research Scientist

Oak Ridge National Laboratory – Computer Science and Mathematics Division

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Relationship: Oak Ridge National Laboratory Co-host