**Dravid Research Group**

Atomic and Nanoscale Phenomena in Advanced Materials

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**Materials for the Environment**

**Hybrid Microscopy**

**Quantum and Energy Materials**

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**Sponge Membranes for Water Remediation**

We develop sponge membranes to leverage novel nanomaterials for environmental challenges, such as oil spill remediation (OMNIA sponge), rainwater recovery (PEARL membrane), and other applications detailed below.

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**Complex Nanoparticle Systems and Automated Electron Microscopy for High-Throughput Materials Discovery**

Cacelin Wah, Alij Kukalooglu


We automate EM data acquisition and analysis with AI for high-throughput materials discovery on nanomaterials, megabytes using 40-STEM, EDS, and TED, and use advanced EM techniques to study the structures and properties of complex multiphase nanomaterials.

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**Hydrogen in Energy and Information Systems (HEISs)**

We address fundamental questions of hydrogen incorporation and transport in solid-state materials for high-performance protonic devices that achieve targeted electrochemical transformations in energy applications and information processing.

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**Carbon Capture**

Functionalized, positively-charged sponges are able to effectively remove plastic contaminants from solution.

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**Advanced Techniques in Electron Microscopy**

Yulan Liu, Mike Binczewski, Alfred Yen, Dr. Roberto dos Reis

Collaborators: Prof. S. Halle, M. Kanatzidis, V. Sargent, NUANCE, Dr. S. Ribe, Dr. C. Ophus

In situ quantitative characterization of microstructure evolution in thermoelectrics

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**Bandgap and Structure Mapping in Solar Cells**

Patricia Meza, Dr. Roberto dos Reis

Collaborators: Prof. M. Kanatzidis

We investigate inverse carbon polycrystalline films to probe the effect of nanometer ordering on properties like bandgap to help synthesize better solar cells, using STEM, EELS, and HAADF.

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**Hierarchically Architecture Thermoelectrics**

Yulan Liu, Mike Binczewski, M. Kanatzidis, C. Wollerlin, O. Farha, S. Snyder

We perform STEM analyses to elucidate structure-property relationships in thermoelectric materials. We further optimize the performance via a hierarchically microstructural architecture.

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**Dravid Research Group**

NUANCE

Atomic and Nanoscale Characterization Experimental Center

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**Department of Materials Science & Engineering**

vdp.ms.northwestern.edu