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PACIFIC NORTHWEST NATIONAL LABORATORY

Next-Generation Materials Discovery and Design Enabled by Data-Infused Electron Microscopy

ABSTRACT

The development of advanced thin film synthesis techniques over the past several decades has sparked a renaissance in the design of nanomaterials for clean energy and quantum computing technologies. While it is now possible to produce oxide and semiconductor thin films in almost limitless configurations, engineering of desirable functionality for device applications depends on precise control of atomistic structure and defects. Complex synthesis pathways can lead to significant deviations from idealized structures, which occur at length scales that are challenging to probe experimentally and theoretically. This task is further compounded by dynamic changes imparted by processing steps and subsequent exposure to extreme environments. Here I will discuss a materials design strategy based on precision synthesis, theory calculations, and atomistic characterization, grounded in emerging data science tools that enable rich, quantitative analysis at scale. Our results illustrate how the full range of information from modern, data-infused electron microscopy can unlock promising new materials for energy storage, electronics, and computing.

BIO

Dr. Steven R. Spurgeon is a research scientist in the Energy and Environment Directorate at Pacific Northwest National Laboratory (PNNL) in Richland, Washington, United States. His work focuses on understanding the synthesis, structure, and properties of nanostructured materials systems for next-generation electronics, quantum computing, and energy storage.

He has published over 45 journal articles and book chapters and has received awards from the U.S. Department of Energy, the National Science Foundation, the Materials Research Society, the Microscopy Society of America, and the U.S. Department of Defense.

Prior to joining PNNL, he received his Ph.D. in Materials Science from Drexel University and his B.S. in Materials Science from Carnegie Mellon University.

Host: Siamak Nejati
Chemical & Biomolecular Engineering

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