



Addenda & Errata

Monday, May 6: CNM Plenary session, updated abstract

Crystallization and Reconfiguration Dynamics in Amorphous Complex Oxides

Paul G. Evans

University of Wisconsin-Madison, Madison, WI 53706

Crystallization methods based on a transformation from an amorphous form to an epitaxial crystal have the potential to expand the range of complex oxide compounds that can be synthesized and to allow epitaxial oxides to be formed in new nanoscale geometries [1]. The crystallization of amorphous oxides involves a series of nanoscale nucleation, crystal growth, diffusion, and defect generation processes in small volumes of material [2]. These processes can involve significant changes in bonding, density, symmetry, and ionic valence. At present, understanding crystallization processes poses a significant challenge to *in situ* x-ray characterization methods. We are presently constructing a vacuum sample environment designed to allow the deposition and crystallization of complex oxides during x-ray characterization experiments employing an x-ray beam focused to a submicron spot. The x-ray scattering capabilities of this instrument will include x-ray reflectivity, diffraction, and scattering from amorphous materials. The APS Upgrade's *In Situ Nanoprobe* beamline and other versatile nanoprobe promise to provide additional insight into chemical and structural changes during crystallization, including at a far smaller scale and with greater chemical sensitivity than is possible with present instruments. This talk will discuss the fundamental challenges involved in understanding crystallization from the amorphous form, planned activities using the sample environment we are presently constructing, and the new range of opportunities that will emerge following the APS Upgrade.

[1] P. G. Evans, Y. Chen, J. A. Tilka, S. E. Babcock, and T. F. Kuech, "Crystallization of amorphous complex oxides: New geometries and new compositions via solid phase epitaxy," *Curr. Opin. Solid State Mater. Sci.* **22**, 229 (2018).

[2] Y. Chen, J. A. Tilka, Y. Ahn, J. Park, A. Pateras, T. Zhou, D. E. Savage, I. McNulty, M. V. Holt, D. Paskiewicz, D. D. Fong, T. F. Kuech, and P. G. Evans, "Seeded Lateral Solid-Phase Crystallization of the Perovskite Oxide SrTiO_3 ," *J. Phys. Chem. C* **123**, 7447 (2019).

Tuesday, May 7: WK1 Joint APS/CNM: Driving Scientific Discovery with Artificial Intelligence, Advanced Data Analysis, updated speaker info

New speaker 9:00 Doga Gursoy (Argonne National Laboratory)
X-ray Microscopy in the APS-U Era: A Computational Perspective

New time 11:00 Daniela Ushizima (Lawrence Berkeley National Laboratory)
Thin Film Structure Identification through Convolutional Neural Networks Applied to Scattering Patterns

Cont'd. Tuesday, May 7: WK1 Joint APS/CNM: Driving Scientific Discovery with Artificial Intelligence, Advanced Data Analysis

New time 4:00 Discussion and Close Out

Tuesday, May 7: WK3 Workshop on Chemical Separations

New speaker 9:00 Brian Stephenson (Argonne National Laboratory)
X-Ray Photon Correlation Spectroscopy of Dynamics in Chemical Separations
(replacing Joan Brennecke)