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Probing the Structure and Dynamic Behaviors of Nanostructured Materials with Atomic Resolution in Real Time

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Abstract: As advances in aberration-corrected transmission electron microscopy (TEM) have enabled the determination of the three-dimensional structure and local electronic properties of nanostructures with the sub-angstrom resolution, the recent development of in situ TEM techniques allows one to study the dynamic response of defects and interfaces to applied fields and changes in environments, while the atomic structure is imaged directly. In this talk, I will present our recent work on in situ TEM studies of the atomic structure, local electronic properties, and dynamic behaviors of nanostructured functional materials, including the nucleation and growth of ferroelectric domains during switching under applied electrical field or mechanical stress, oxidation/reduction of self-regenerating catalysts within a gas-reaction holder, and structural evolution of Li-ion battery materials induced by electrical field, and filament formation in resistance switching memories.

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