

Probing Nanostructured Materials Atom by Atom: A High Resolution Aberration-Corrected Electron Microscopy Study

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Defects can have a profound effect on the macroscale physical, chemical, and electronic properties of nanostructures. They can lead to structural distortions, introduce extra states in the band gap and give rise to excess potential locally at buried interfaces. While defects and interfaces have been a well-studied subject for decades, little is known about their local atomic and chemical structure and the sub-Angstrom structural distortions within their vicinity. Using high-resolution aberration-corrected S/TEM imaging and spectroscopy, this talk will discuss our recent efforts on the determination of the defect chemistry and sub-Angstrom relaxation effects in nanostructures around dopants, grain boundaries, domain walls, and interfaces in the family of 2D crystals, complex oxides, and novel nanostructures.