



東京大学微細構造解析 プラットフォーム公開講演会

“A New Spin on Characterizing Dielectric Materials with Scanning Transmission Electron Microscopy”

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Within the past decade, electron microscopy has been revolutionized by the advent of the aberration corrector. Aberration correction dramatically improves spatial resolution into the sub-ångstrom regime, unlocking information about material defects. While these recent advances have proven essential to the atomic scale characterization of materials, measurement of atomic displacements and distances from STEM images were until recently hampered by the presence of sample drift. This limitation has obscured the capabilities to characterize minute changes to the atomic structure that ultimately control properties. In this talk, I will introduce revolving scanning transmission electron microscopy (RevSTEM). The method uses a series of fast-acquisition STEM images, but with the scan coordinates rotated between successive frames. This scan rotation introduces a concomitant change in image distortion that is then used to analyze the sample drift rate and direction. Multiple case studies will be presented to demonstrate the power of this new technique to characterize dielectric materials. For example, I will show how picometer level precision enables the capability to directly observe static atomic displacements within a complex oxide solid solution. Furthermore, using ferroelectric HfO₂ thin films, I will also show how RevSTEM images can be used to accurately determine crystallographic parameters in real-space, and to determine the structural origins of polarization. These results open a new world of atomic scale exploration that was previously just beyond our reach.

November 19 (Thu), 2015 14:00~15:30

**Main meeting room at Institute of Engineering Innovation, UT
(工学部総合研究機構 9号館 1階 大会議室)**

Organizer: Prof. Naoya Shibata and Prof. Yuichi Ikuhara