東京大学工学系研究科総合研究機構
第18回次世代ジルコニアセミナー

Local to Meso-scale Order in Non-Linear Dielectrics Characterized by Scanning Transmission Electron Microscopy

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The ability to design the composition and microstructure of electronic ceramics for emerging technological applications requires sophisticated characterization techniques that can provide quantitative information about local structure and chemistry at the atomic scale. Such structure quantification is particularly important to the fundamental understanding of properties in many important non-linear dielectrics, where chemical heterogeneities associated with dopants or intrinsic lattice defects give rise to local inhomogeneities in charge, strain and polarization. Such local deviations from the global average structure and symmetry are often linked to enhancements in macroscopic dielectric and electromechanical properties. This seminar discusses the use of scanning transmission electron microscopy (STEM) to quantify short- and medium-range lattice disorder in electronic ceramics, focusing on new CMOS-compatible ferroelectrics (e.g. based on HfO_2, AlN and ZnO). The ability to quantify local structure on a sublattice basis and in real space provides unique insight into the polarization of these materials.

日時：2024 年 11 月13日（水）15:00～16:30　ハイブリッド開催
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