Three-dimensional characterization of various crystalline materials by electron microscopy

Kenji KANEKO

Department of Materials Science and Engineering, Kyushu University, Fukuoka 819-0395, Japan

Nanoscale characterization plays a vital role in process, design and property of materials used in nanoscience and nanotechnology. Large numbers of research papers have been published concerning nanoscale materials based on characterizations by electron microscopes displaying 2D images, which is not reflecting the true 3D nature of materials, and authors have to correlate 2D images with 3D physical properties of materials, in general. Recent developments of fully-digitized and automated electron microscopes let us achieve 3D information, either the combination of focus ion beam (FIB) and SEM via slice-sectioning (SS) or that of (S)TEM and computed tomography (CT).

In this talk, I will present recent results obtained from various crystalline materials obtained by both (S)TEM-CT and FIB-SEM-SS.

References
FIG. 1(a): a reconstructed volume of Ge precipitates in Al-Ge alloy [1].

FIG. 2(a): A STEM-BF image and a reconstructed volume of β’’ precipitates with dislocations in Al-Mg-Si alloy [2].

FIG. 3: Reconstructed volumes of intragranular NbC in SUS347 seeing from different orientations [3].