

In-depth Understandings of SOFC Electrode Microstructure by using Advanced 3D FIB Tomography Technique

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Recent advancement in the nano-scale 3D imaging techniques, such as focused ion beam scanning electron microscopy (FIB-SEM) and X-ray nano-CT, have enabled us to access to the details of complex microstructures of energy materials. Solid oxide fuel cells are expected as promising energy conversion devices because of their ability to convert chemical energy of fuel into electrical energy in an efficient and environmentally friendly manner. The typical electrodes of SOFCs are submicron-scale porous materials consisting of metal and ceramic particles, and their microstructure is considered to have a significant influence on the performance of SOFC electrodes, through the transport of chemical species and the electrochemical reaction.

A brief history of the application of FIB technique to the investigation of SOFC materials will be presented with my experience in this field, from the technological challenges that we overcame in the early stage of the work to the latest topics that involve microstructural designing of SOFC electrodes by nano-particle infiltration technique.