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# Characterization of Porosity and Flow in Solid Oxide Fuel Cell with 3D Focused Ion Beam Serial Slicing

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**Abstract :** DualBeam (FIB-SEM) has long been the technology of choice to sub-sample and characterize materials at site-specific locations which are difficult or impossible to extract by conventional embedding/polishing methods. Whereas Ga based FIB provides excellent resolution and enables precise material removal, the current is usually limited and only allows the extraction of small material biopsies typically ranging from 5-70um wide. Xe Plasma FIB, by contrast, has around 38x more current and can remove more material at the same time to extract significant sized chunks (100-1000um) of materials for further analysis. This increased volume has enabled time-prohibitive investigations like large grain 3D serial sectioning and EBSD and micro-machining for micro-mechanical testing. Investigation of the pore spaces with 3D modeling can determine the relative characteristics of the materials to help design or select properties for best function. Pore spaces can be described with a tortuosity number which is calculated by modules in the 3D analysis software. Xe Plasma FIB technology provides a workflow with sufficient volume to characterize porosity when both large-volume 3D materials characterization and nanometer resolution is required to understand the system.

**Keywords :** dual-beam, FIB-SEM, porosity, SOFC, solid oxide fuel cell
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