

3-Dimensional reconstruction of self-humidifying dual catalyst layer using FIB-SEM images

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Retention of the liquid water generated from the cathode has been considered a major point of improving PEMFCs performance. Using the inner hydrophilic and outer hydrophobic dual-layers at lower relative-humidity conditions can lead to further enhancement on the cell performance. It is important to know how structures of dual catalyst layers effect on fuel cell performance. To study this, we reconstruct the dual catalyst layers into 3-dimensions by using Focused Ion Beam-Scanning Electron Microscopy (FIB-SEM) images. The FIB-SEM tomography is employed to obtain the pore-structural parameters of the two catalyst layers, including diffusivity and tortuosity. The reconstructed structure is simulated to obtain the properties such as gas diffusivity, tortuosity, pore size distribution, open and closed porosity and surface area. The outer catalyst layer shows narrower pore size distribution than the inner catalyst layer. It would be beneficial in achieving the water retention.