

Microstructure Analysis and Calculation of Thermal Conductivity of Gas Diffusion Layers of PEM Fuel Cells

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Abstract

The effective thermal conductivity of gas diffusion layers (GDL) is an important parameter for the analysis of polymer electrolyte membrane (PEM) fuel cells as thermal conductivity strongly influences fuel cell performance. The accuracy of modeling heat transfer – and therefore also performance – in a PEM fuel cell relies on the accurate estimation of effective thermal conductivity.

Commercially available gas diffusion layers were investigated by 3D x-ray computed tomography (CT). Based on the 3D structure reconstructed from tomography data, the macroscopic effective thermal conductivity of the gas diffusion layers was calculated by solving the energy equation considering a pure thermal conduction problem.