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Analysis of gas transport in polymer electrolyte fuel cells using porous structure constructed from X-ray nano CT[1] IKUYA KINEFUCHI, The University of Tokyo, JUNPEI OYAMA, KOJI YOKOYAMA, NORIO KUBO, FC-Cubic, TAKASHI TOKUMASU, Tohoku University, YOICHIRO MATSUMOTO, The University of Tokyo — This paper describes the analysis of gas transport in micro porous layers of polymer electrolyte fuel cells based on the three-dimensional structure obtained from X-ray nano computed tomography (CT). The polygonal surface representation of the porous structure was constructed from the cross-sectional CT images using the marching tetrahedrons algorithm. The diffusion flux through the porous layer was evaluated by the direct simulation Monte Carlo method since the characteristic pore size is comparable to the mean free path of gas molecules. The numerical simulation well reproduces the experimentally observed pressure dependence of diffusion resistance originating from the transition between Knudsen and molecular diffusion regimes. The effect of porous media morphology on gas transport was examined by an analysis of the trajectories of transmitted molecules through the porous layer.

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