

Statistical approach in a two-dimensional agglomerate model for a polymer electrolyte membrane fuel cell (PEMFC)

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The modified agglomerate model is developed considering the actual size distribution of agglomerates for polymer electrolyte membrane fuel cell (PEMFC). In previous agglomerate model study, the PEMFC models assume the size of agglomerates in the catalyst layer as a constant of the average agglomerate size. In this study, the agglomerate-size distribution using nanotomography and numerical simulations applied in two-dimensional PEMFC model to improve the accuracy. The model was validated by comparing the experimental data, and numerical study was performed in order to confirm difference between statistical approach and previous agglomerate model. The size of agglomerates affects various parameters, agglomerate density, number of agglomerates per unit volume and volume fraction of catalyst in catalyst layer. The result showed that the actual microstructure of fuel cell should be considered to calculate accuracy result.