Computational Fluid Dynamics Modeling of High-Temperature Proton Exchange Membrane Fuel Cell using a Phosphoric Acid Doped Polybenzimidazole Membrane

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Low-temperature (LT) proton exchange membrane fuel cell (PEMFC) has attracted a great attention as a promising candidate for alternation of automobile power source. However, performance degradation by carbon monoxide (CO) poisoning cause very limited choice of fuel such as ultrapure hydrogen (H2). High operating temperature, ranging from 100 ℃ to 200 ℃, can avoid such a problem by dramatically improving CO tolerance. In this study, a high-temperature (HT) PEMFC modeling is implemented by considering CO adsorption in catalytic surface. HT PEMFC modeling features have been compared with LT PEMFC in various perspectives, e.g. agglomerate formation, water transport through the membrane, etc. Effect of CO concentration in H2 feed is investigated with different operating temperatures to predict performance degradation.