

Metal-doped TiO₂ nanotube supported catalysts to improve high activity and durability for oxygen reduction reaction

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ORR is one of the most important electrochemical reactions occurring at the cathode of PEMFCs. In general, the most commonly used electrocatalyst for the ORR is based on Pt/C. However, carbon supports often suffer from low durability because of their corrosion problem and Pt agglomerate due to the collapse of carbon. To improve the catalytic activity and durability, highly dispersed Pt on the stable oxide supports with high surface area have been adopted. Among them, TiO₂ has been widely used for electrochemical applications. TiO₂ is stable but has a poor electrochemical conductivity. Doping n-type dopants is improve the electrical conductivity. In this study, we developed the metal doped-TiO₂ support catalyst with SMSI between metal and TiO₂. Controlling the morphology of TiO₂ into nanotube was used as a strategy to improve the activity and to highly disperse the Pt on the supports with high surface area. The ORR activity and durability of Pt/M-TiO₂ nanotube catalysts compared to Pt/C catalyst were tested by three-electrode cell. Based on this, we identified the optimal concentration of metal dopants on the TiO₂ nanotube to improve ORR activity and durability with SMSI.