

Non-Precious Metal Catalysts Based on Self-Supported Ordered Mesoporous Carbons Exhibiting Pt-like Electrocatalytic Activity for Oxygen Reduction

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The quest for low-cost, high-performance non-precious metal catalysts for the oxygen reduction reaction (ORR) has recently been of prime importance in polymer electrolyte fuel cell (PEFC). However, the ORR activity of the non-precious metal catalysts is still fairly inferior to the Pt-based catalysts. In this presentation, the preparation and electrocatalytic applications of a new self-supported, transition metal-doped ordered mesoporous porphyrinic carbon (M-OMPC) catalysts with high surface areas and tunable pore structures will be presented. Of M-OMPC catalysts, FeCo-OMPC exhibited an extraordinarily high ORR activity in an acidic medium, which was the best among the non-precious metal catalysts reported in the literature, and outperformed the carbon-supported Pt (Pt/C) catalyst. Furthermore, the FeCo-OMPC showed superior long-term durability and methanol-tolerance in ORR. The weakening of the interaction between oxygen atom and the FeCo-OMPC compared to Pt/C as well as high surface area of the former could be responsible for its significantly high ORR activity.