

Self-Supported Pt-M Mesostructured Nanospheres with Intermetallic phase as Ultrastable Oxygen Reduction Electrocatalysts

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Enhancing the activity and stability of the cathode catalyst in proton exchange membrane fuel cells (PEMFCs) is of great importance for their commercialization. In this work, self-supported 3D mesostructured Pt-Ni bimetallic nanospheres with intermetallic phase (Meso-PtNi) were prepared by nanocasting mesoporous silica nanospheres. This synthetic method was generalized for various compositions such as Pt-Co, Pt-Fe, and Pt-Cu. Meso-PtNi catalysts showed enhanced performance in oxygen reduction reaction (ORR) measurement due to mesostructured morphology and Pt-Ni composition. Importantly, during the acceleration degradation test (ADT), the Meso-PtNi was activated during the early stage of ADT, and retained increased ORR activity up to 50,000 potential cycling. Finally, the very high activity of Meso-PtNi was also demonstrated in single cell configuration.