Atomically dispersed hollow spherical bimetallic(Co, Fe) electrocatalysts using spray pyrolysis with improved stability for Oxygen Reduction reaction in acidic condition

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Pt-based alloys have been proven to be the most efficient catalysts for oxygen reduction reaction (ORR) in proton exchange membrane fuel cells (PEMFCs). However, their CO deactivation and high cost as well as the limited reserves of Pt hinder theirl application. M-N-C catalysts for ORR from low-cost and earth abundant metal elements have exhibited a great promise to replace platinum-based catalysts for PEMFCs. But insufficient stability is the major hurdle to prohibit their practical applications. In this study, we designed and synthesized bimetallic electrocatalysts which have enhanced stability in acidic condition with improved ORR activity by making metal interactions. Bimetallic (Co, Fe) oxides were prepared first by spray pyrolysis, followed by ZIF conversion and carbonization to bimetallic M-N-C electrocatalysts. Spray pyrolysis has advantages of component dispersibility and making hollow sphere that is ideal structure for mass transport without template. The product electrocatalysts showed high surface area and catalytic activity with reduced mass transport resistance. The synthesized bimetallic catalysts were analyzed by BET, XRD, FE-SEM and electrochemical analysis system.