Metal-organic Frameworks Derived CoS₂-Co/N-doped Porous Carbon with Extremely High Electrocatalytic Stability for the Oxygen Reduction Reaction

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The electrocatalytic performances for the oxygen reduction reaction (ORR) highly depend on the structure and composition of catalysts. In this work, a novel non-precious metal catalyst (CoS₂-Co/N-doped porous carbon) has been fabricated by the carbonization of metal-organic frameworks (MOFs) with a consequent sulfuration process. The resultant nanocomposite exhibits highly desirable structure features for ORR, such as high-efficient Co-N-C active sites, porous carbon nanostructures for rapid mass transfer, and CoS₂ protective layers that prevent Co-N-C active sites from deactivation. As a result, the rationally designed catalyst shows extremely high electrocatalytic stability with a high current retention of ~ 98 % after 10 h in alkaline media.

Keywords: Oxygen reduction reaction; Nanocomposites; Metal-organic frameworks; Electrocatalysis.

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