Phosphorylated NiCo Metal–Organic-Frameworks for Efficient Oxygen Evolution Reaction

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The development of abundant-element-based, cost-effective, and efficient catalysts for oxygen evolution reaction (OER) holds great promises to realize the practical water splitting. Herein, we report a facile phosphorylation treatment to boost the OER performance of NiCo metal organic frameworks (MOFs). Compared with the parent hollow bowl-like sphere NiCo-MOF, the optimal NiCo-MOF/Co₂P₂O₇ had a lower overpotential of 408 mV at 50 mA cm⁻² and 583 mV at 200 mA cm⁻². The MOF/Co₂P₂O₇ sample also demonstrated markedly superior long term durability for OER to the benchmark RuO₂ catalyst. Such excellent performance can be attributed to the well-defined porous structure imparted enhanced reaction kinetics, the formation of phosphates with high oxygen content, and the synergistic catalytic effects of between Ni and Co. The findings here offer a new way in developing high-efficiency and durable MOF-based electrocatalysts for water splitting and beyond.

Keywords: Phosphorous treatment; NiCo alloy; Metal organic frameworks; Oxygen evolution reaction, Long term durability

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