One-step Hydrothermal Synthesis of Amorphous Nickel/Iron Oxide and its Application as Catalyst for Efficient Oxygen Evolution Reaction

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It is of great significance to explore low-cost and high-efficiency oxygen evolution reaction electrocatalysts to meet the challenges of sustainable energy development. In this paper, amorphous nickel-iron oxide was successfully synthesized via a simple one-step hydrothermal method with the help of citric acid-sodium citrate buffer solution and template CTAB. Excellent dispersion and porous structure were found for the obtained samples, which significantly increase the exposed surface area of active sites of the catalyst. In addition, the morphology of Ni-Fe oxides could be controlled and the electronic structure of Ni could be modified by changing Ni/Fe mole ratio. When Ni/Fe mol ratio equals 3:1, this material exhibits the best catalytic activity, with an overpotential of only 197 mV at the current density of 10 mA cm⁻² and Tafel slope of 39 mV dec⁻¹. Thus, this work provides an economical way to prepare efficient electrocatalysts based on transition metal elements.

Keywords: Ni_xFe₁ oxide, Amorphous, Oxygen evolution reaction, Hydrothermal

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