Facile Synthesis of Ni-Co LDH Nanocages with Improved Electrocatalytic Activity for Water Oxidation Reaction

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The development of an inexpensive, efficient and robust water oxidation catalyst is important to achieve water splitting for renewable energy production. Herein, nickel-cobalt layered double hydroxides (Ni-Co LDHs) were rationally synthesized by a facile method and can be served as efficient electrocatalysts for water oxidation. For comparison, Ni-Co LDH nanoflowers have also been synthesized by controlling the synthetic process. The composition and morphologies of the catalysts were characterized by X-ray diffraction (XRD), field-emission scanning electron microscopy (FESEM) and X-ray photoelectron spectroscopy (XPS). The as-obtained Ni-Co LDH nanocages exhibit a high catalytic activity toward the water oxidation reaction (WOR). The electrochemical results show that the overpotential of Ni-Co LDH nanocages electrode was 350 mV at a catalytic current density of 10.0 mA cm⁻² in 1.0 M KOH. Moreover, the Tafel slope was as low as ~ 93 mV dec⁻¹. The unusual catalytic properties of Ni-Co LDH nanocages could be attributed to the hollow structure and the synergetic effect between Ni metal and Co metal.

Keywords: Ni-Co LDH; nanocages; ZIF-67; electrocatalysis; water oxidation

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