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Oxygen Evolution Catalytic Performance of Quantum Dot Nickel-Iron Double hydroxide/Reduced Graphene Oxide Composites

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Abstract

In this work, we successfully synthesized NiFe-LDH@RGO composites through a facile hydrothermal method. Therein, multiple composite samples with different mass ratio of NiFe-LDH and RGO were synthesized in order to improve its OER activity. Structural characterizations of these samples were investigated by XRD, Raman, SEM, TEM and HRTEM, and it shows that NiFe-LDH quantum dots with the average size of 5nm dotted on the RGO sheets uniformly without any agglomeration. The OER tests show that, the NiFe-LDH@RGO=1/1 sample can be used as a good OER catalyst with the overpotential of 313 mV (vs. RHE) at the current density of 10 mA cm^{-2} and Tafel slope of 35.1 mV dec^{-1} .

1. Introduction

The oxygen evolution reaction (OER) is one of the cornerstones of many renewable energy conversion and storage technology such as metal-air batteries, fuel cells, and water splitting [1-3]. Its high activation overpotential and sluggish kinetics caused it need a high performance catalyst[4, 5]. The catalysts used in business nowadays are precious metal-based materials, like Pt-based and Ru-based, Ir-based catalysts with high catalytic activity [6-8]. But the expensive price and rare earth content limit its large-scale application, and cased the study about low-cost and good efficacy electrocatalysts [9-11].