

One-pot synthesis of NiFe layered double hydroxide/reduced graphene oxide composite as an efficient electrocatalyst for electrochemical and photoelectrochemical water oxidation

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As an efficient non-precious metal catalyst for oxygen evolution reaction (OER) in electrochemical and photoelectrochemical water splitting, NiFe layered double hydroxide (LDH)/reduced graphene oxide (NiFe/RGO) composite is synthesized by a simple solvothermal method in one-pot. NiFe LDHs are uniformly deposited on RGO layers of high electrical conductivity and large surface area. In electrochemical water splitting, NiFe/RGO shows superior OER performance compared to bare NiFe and reference IrO₂ with a lower benchmark η_{10} value (required overpotential to drive 10 mAcm⁻²) of 0.245 V. The enhanced activity of NiFe/RGO is ascribed to RGO layers which could provide a good electrical pathway for loaded NiFe LDHs and a high surface area. Furthermore, NiFe/RGO substantially increases the performance of a hematite photoanode in photoelectrochemical water oxidation, demonstrating its potential as an OER co-catalyst for photoelectrodes.