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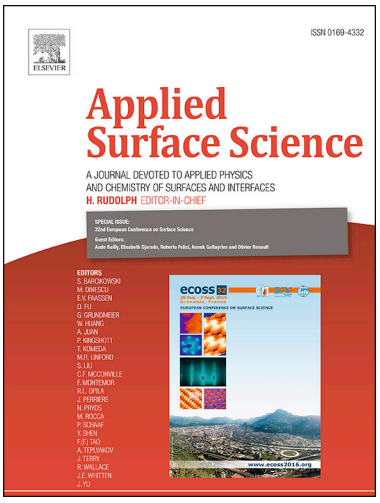

Full Length Article

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Fe_3O_4@NiS_x/rGO Composites with Amounts of Heterointerfaces and Enhanced Electrocatalytic Properties for Oxygen Evolution

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Abstract

The sluggish oxygen evolution kinetics involved in water splitting and various metal-air batteries makes the effective and inexpensive electrocatalysts be highly desirable for oxygen evolution reaction (OER). Herein, an effective and facile two-step route is developed to construct Fe_3O_4@NiS_x composite loaded on reduced graphene oxide (rGO). The morphology and microstructure of the composites were characterized by different characterization techniques. The obtained composites show amounts of heterointerfaces. The shift of binding energy in X-ray photoelectron spectrum demonstrates the existence of interfacial charge transfer effect between Fe_3O_4 and NiS_x. The optimized Fe_3O_4@ /rGO sample exhibits excellent electrocatalytic performance toward OER in alkaline media, showing 10 $mA \cdot cm^{-2}$ at η = 330 mV, lower Tafel slope (35.5 $mV \cdot dec^{-1}$), and good durability, demonstrating a great perspective. The excellent OER performance can be ascribed to the synergetic effect between Fe and Ni species. It is believed that the heterointerfaces between Fe_3O_4 and NiS_x perform as active centers for OER.

Keywords: Heterointerfaces; Oxygen evolution; Nickel sulfides; FeNi materials; Electrocatalysts; Iron oxide