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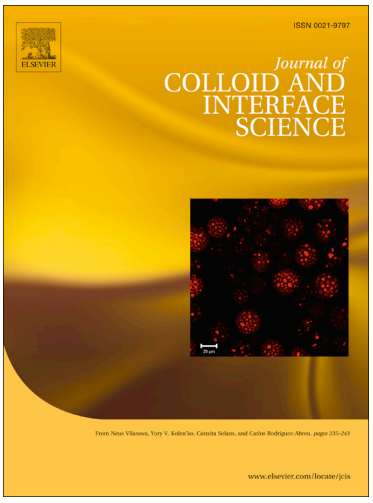

SILAR deposited iron phosphate as a bifunctional electrocatalyst for efficient water splitting

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SILAR deposited iron phosphate as a bifunctional electrocatalyst for efficient water splitting

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Abstract

The development of efficient and earth-abundant electrocatalysts for overall water splitting is important but still challenging. Herein, iron phosphate (FeP*i*) electrode is synthesized using a successive ionic layer deposition and reaction (SILAR) method on a nickel foam substrate at room temperature and is used as a bifunctional electrocatalyst for water splitting. The prepared FeP*i* electrodes show excellent electrocatalytic activity and stability for the oxygen evolution reaction (OER) and hydrogen evolution reaction (HER). The FeP*i* electrode exhibits low overpotential of 230 mV and 157 mV towards the OER and HER, respectively, with superior long-term stability. As a result, an electrolyzer that exploits FeP*i* as both the anode and the cathode is constructed, which requires a cell potential of 1.67 V to deliver a 10 mA cm^{-2} current density in 1 M KOH solution. The exceptional features of the catalyst lie in its structure and active metal sites, increasing surface area, accelerated electron transport and promoted reaction kinetics. This study may provide a facile and scalable approach to design a high-efficiency, earth-abundant electrocatalyst for water splitting.

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