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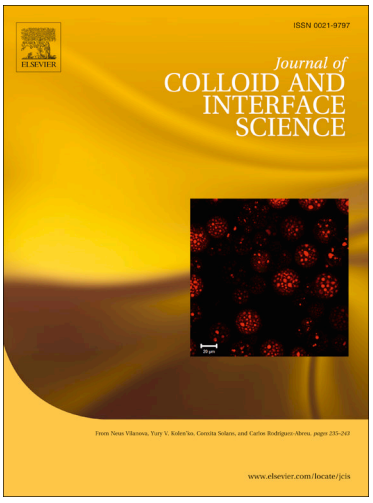

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PII: S0021-9797(18)30721-5
DOI: https://doi.org/10.1016/j.jcis.2018.06.073
Reference: YJCIS 23764

To appear in: *Journal of Colloid and Interface Science*

Received Date: 25 April 2018
Revised Date: 24 June 2018
Accepted Date: 25 June 2018

Please cite this article as: H. Xu, J. Wei, C. Liu, Y. Zhang, L. Tian, C. Wang, Y. Du, Phosphorus-doped cobalt-iron oxyhydroxide with untrafine nanosheet structure enable efficient oxygen evolution electrocatalysis, *Journal of Colloid and Interface Science* (2018), doi: https://doi.org/10.1016/j.jcis.2018.06.073

Phosphorus-doped cobalt-iron oxyhydroxide with untrafine nanosheet structure enable efficient oxygen evolution electrocatalysis

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Abstract

Although explosive progresses have been achieved in the field of water splitting, the design and development of stable and inexpensive electrocatalysts for oxygen evolution remain a formidable challenge. Herein, the cost-efficient two dimensional (2D) phosphorus-doped oxyhydroxide CoFe nanosheets (denoted as CoFeP NSs) are successfully engineered and showing exceptional oxygen evolution reaction (OER) activity and chemical stability in 1 M KOH solution. This unique 2D nanosheet structure facilitates the mass transfer and electron transport, resulting in the remarkable OER activity that delivers a current density of 10 mA cm^{-2} at a low overpotential of 305 mV with an ultra-small Tafel slope 49.6 mV/dec. More significantly, the doped P also plays a vital role in modulating the surface active sites, leading to the substantial enhancement of electrocatalytic performances. Our study provides a facile one-pot method for the successful fabrication of 2D P-doped CoFe NSs which display superior electrocatalytic performance, shedding great promise for environment and energy-related fields.

Keywords: CoFeP oxyhydroxides; Two dimensional nanosheets; Oxygen evolution reaction; Phosphorus dopant