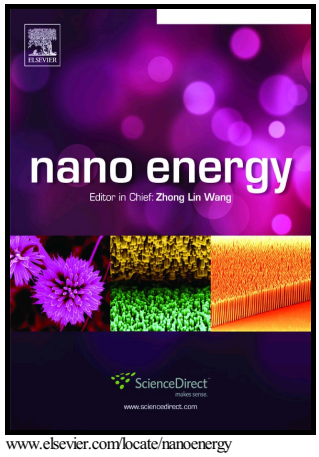

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Abstract

Due to the large overpotentials on both cathodic hydrogen evolution reaction (HER) and anodic oxygen evolution reaction (OER) during the process of water splitting, the large-scale production of hydrogen is limited. Therefore, it is crucial to find earth-abundant, low-cost and efficient bifunctional catalysts for such process. In this paper, we report one-step electroreductive deposition of Fe-Co composite films on carbon fiber papers (CFPs) in a solution containing Fe(III) and Co(II) ions without and with N_2 bubbling, and the prepared composite films show highly efficient electrocatalytic performances and good durabilities for both OER and HER in 1.0 M KOH. To reach a current density of 10 mA cm^{-2}, the overpotentials are only 283 mV for OER and -163 mV for HER with small Tafel slopes of 34 and 51 mV dec^{-1}, respectively. Moreover, the Fe-Co composite films can be used as bifunctional catalysts for water splitting with the current density of 10 mA cm^{-2} at 1.68 V, which is comparable with most of the Ni-based films reported. This proves that the Ni-free derivatives of 3d transition metals can also show high catalytic performance.