

A simple technique to attach the OER catalyst on hematite photoanode for enhanced photoelectrochemical water splitting

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ABSTRACT

The improvement of poor oxygen evolution reaction (OER) property of semiconductor is one of the key points in achieving efficient photoelectrochemical (PEC) water splitting from a semiconductor surface. Over the past decade hematite (α -Fe₂O₃) have been intensively investigated for photochemical and photocatalytic applications. However, the hematite has been suffered from inferior OER property, leadings to high onset potential and low PEC performance. In this paper, we address the poor OER property of hematite by coupling of Zn-Co LDH serving as a highly active OER catalyst. The OER catalyst, i.e. Zn-Co LDH nano-sheets have been synthesized by a simple microwave treatment. The Zn-Co LDH are decorated on hematite photoanode via a simple immersing technique. The synergistic effect of Zn-Co LDH decoration results in decreasing the onset potential of more than 300 mV, from 0.86 VRHE to 0.54 VRHE, and in increasing the photocurrent density from 0.60 mA/cm² to 2.00 mA/cm² at 1.50 VRHE. Our approach demonstrates strategies to overcome onset potential limitations as well as poor OER properties of hematite and leads to a remarkably improved PEC water splitting performance.