

## Supplemental Material of

### “FeO-based hierarchical structures on FTO substrates and their photocurrent”

Weiwei Xia<sup>a</sup>, Jiawei Sun<sup>a</sup>, Xianghua Zeng<sup>a,b\*</sup>, Pengdi Wang<sup>a</sup>, Min Luo<sup>a</sup>, Jing Dong<sup>a,c</sup>, Huaguang Yu<sup>a</sup>

<sup>a</sup> College of Physics Science and Technology & Institute of Optoelectronic Technology, Yangzhou University, Yangzhou 225002, P.R. China

<sup>b</sup> College of Electrical, Energy and Power Engineering, Yangzhou University, Yangzhou 225127, P. R. China

<sup>c</sup> College of Chemistry and Chemical Engineering, Yangzhou University, Yangzhou 225002, P.R. China

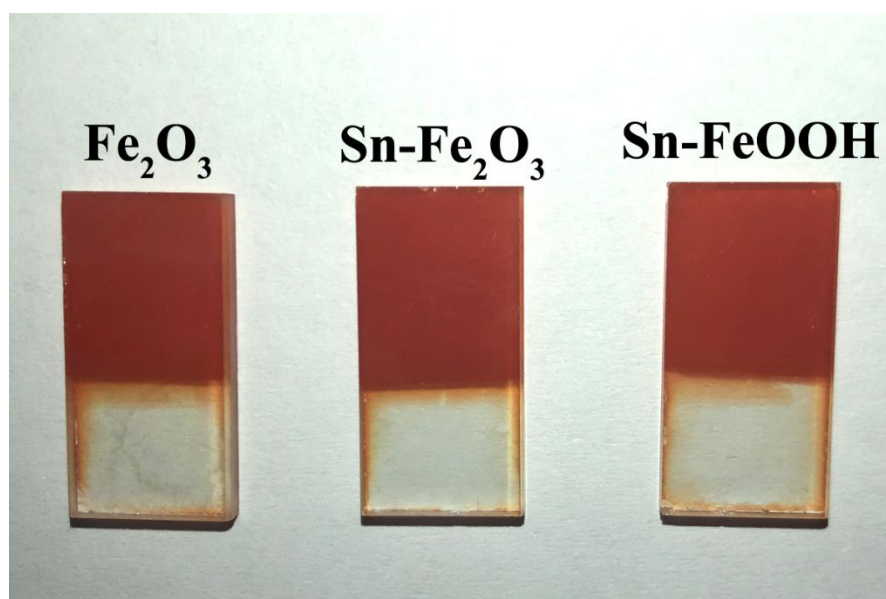


Figure S1 Photograph of the obtained Fe<sub>2</sub>O<sub>3</sub>, Sn-Fe<sub>2</sub>O<sub>3</sub>, Sn-FeOOH NR arrays.

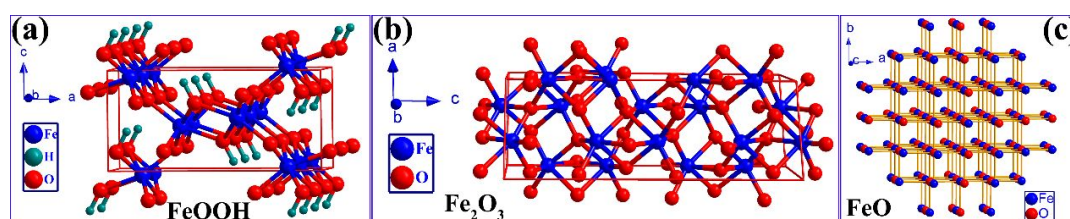
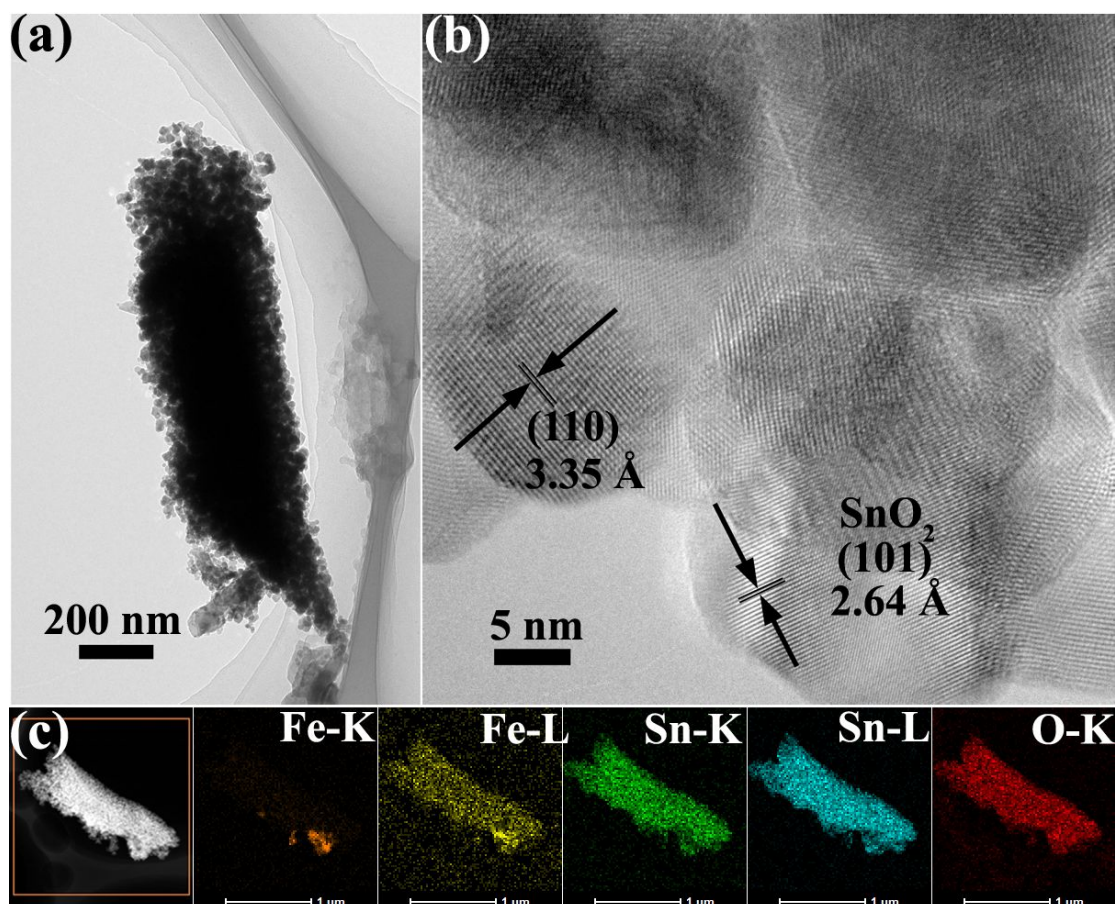
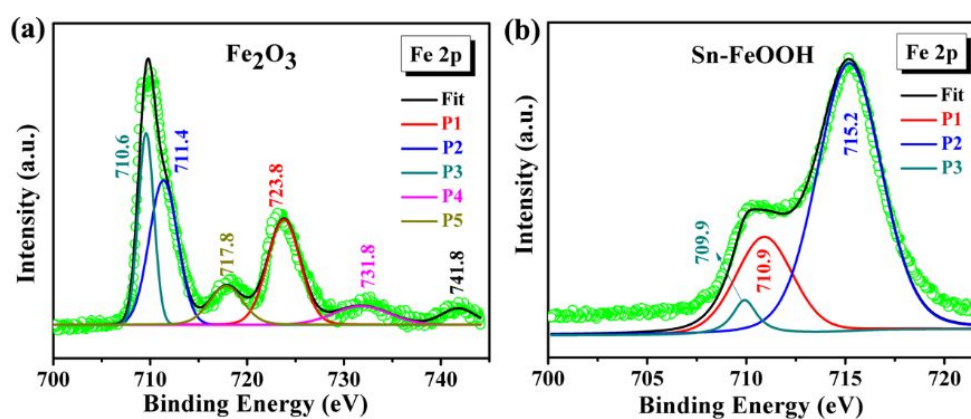


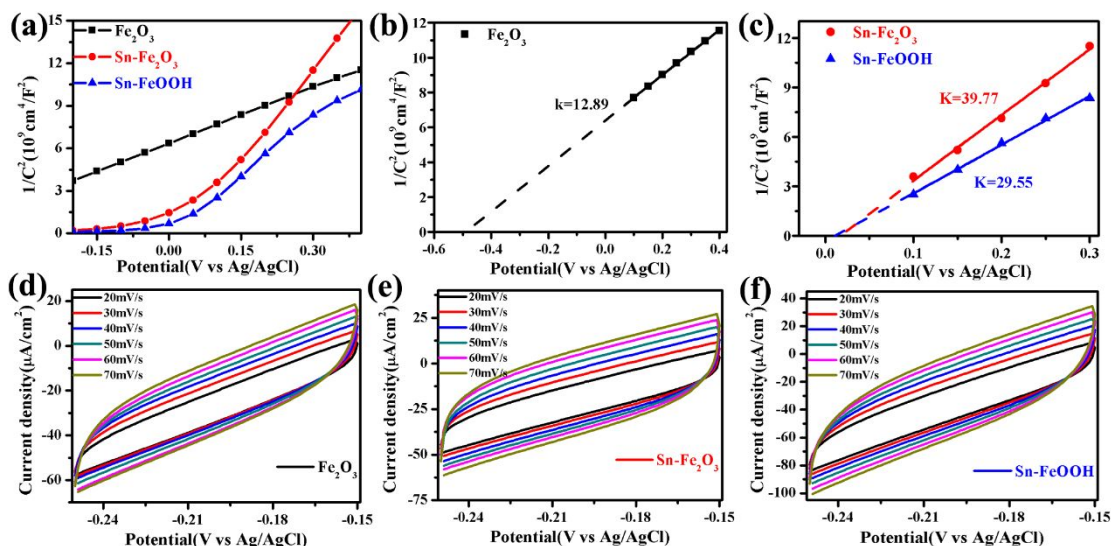
Figure S2 Crystal Structures of FeOOH (a), Fe<sub>2</sub>O<sub>3</sub> (b) and FeO (c).



**Figure S3** (a) TEM and (b) HRTEM characterization of an individual Sn-Fe<sub>2</sub>O<sub>3</sub> NR; (c) Elemental mapping images of an individual hybrid NR in Sn-FeOOH sample.



**Figure S4** Deconvoluted peaks of Fe 2p for Fe<sub>2</sub>O<sub>3</sub> (a) and Sn-FeOOH NRs (b).



**Figure S5** (a) Mott –Schottky (MS) plots obtained from the electrochemical impedance spectroscopy measurement for three samples; (b-c) Slope fit from -0.5 to 0.4V; Cyclic voltammetry (CV) of at various scan rates for (d)  $\text{Fe}_2\text{O}_3$ , (e)  $\text{Sn-Fe}_2\text{O}_3$ , and (f)  $\text{Sn-FeOOH}$  NRs.

**Table S1** Deconvolved O 1s spectra

Samples	Peak (eV)	Vacancy Ratio
$\text{Fe}_2\text{O}_3$	529.26	40.7%
	530.48	
$\text{Sn-FeOOH}$	529.54	42.8%
	530.48	
$\text{Sn-Fe}_2\text{O}_3$	529.26	40.2%
	530.55	