Electronic Supplementary Material (ESI) for RSC Advances.

Electronic supplementary information (ESI)

Photoelectrochemical Activity of $ZnFe_2O_4$ Modified α-Fe_2O_3 Nanorod Array Films

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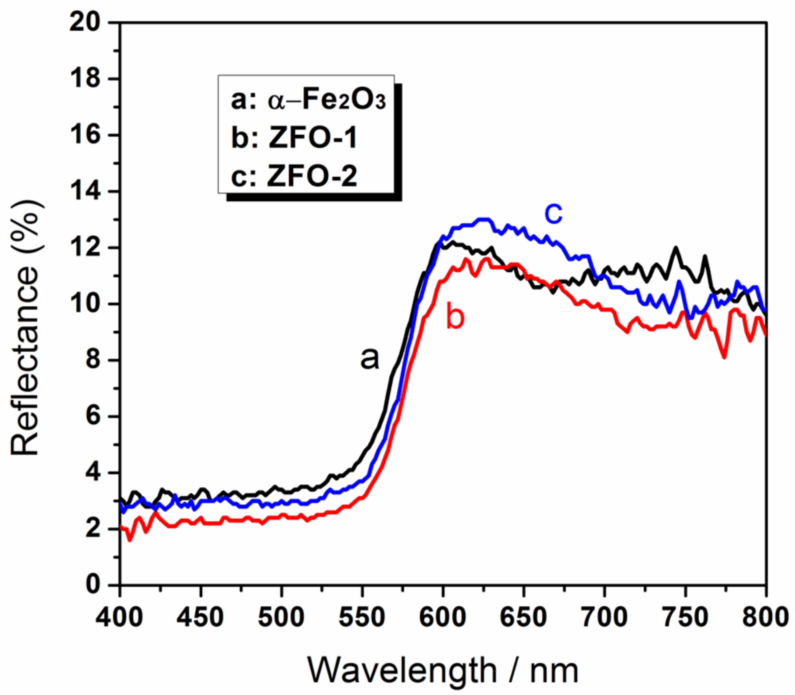

Fig. S1. Spectral reflectance for pristine α-Fe_2O_3 and $ZnFe_2O_4$ modified α-Fe_2O_3 (ZFO-1 and ZFO-2) nanorod films.

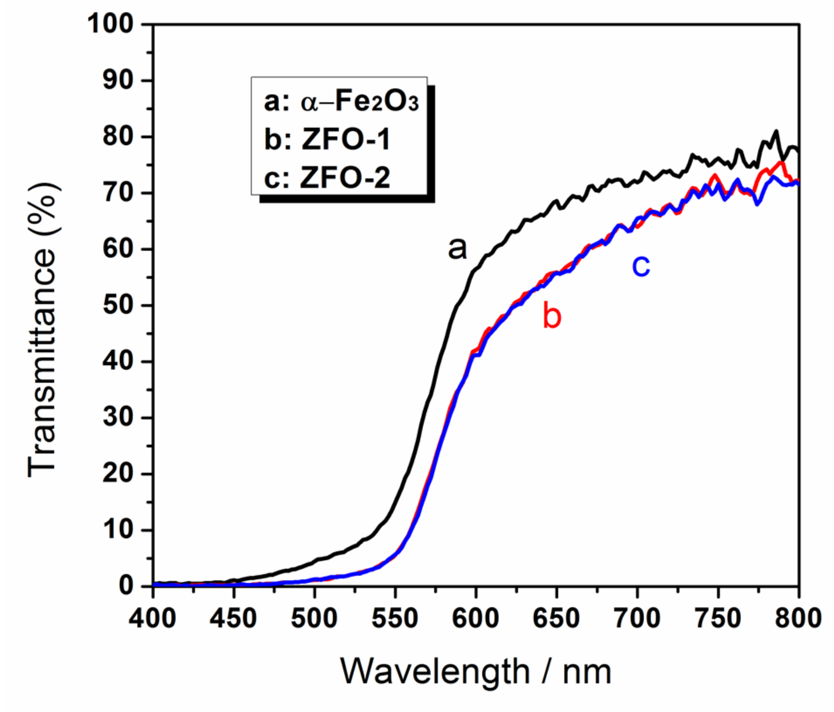

Fig. S2. Spectral transmittance for pristine α-Fe_2O_3 and $ZnFe_2O_4$ modified α-Fe_2O_3 (ZFO-1 and ZFO-2) nanorod films.

The band gap can be determined from transmittance and reflectance spectra using the Tauc plot method as expressed in equation (1).[1]

$$\alpha h\nu = C(h\nu - E_g)^n \qquad (1)$$

where α is the absorption coefficient, $h\nu$ the photon energy, C the photon energy dependent constant, and E_g the band gap energy. Exponent n takes 1/2 and 2 for direct and indirect optical transition, respectively. In addition, the absorption coefficient α can be expressed by equation (2).[2]

$$\alpha d = \ln(T/(1 - R)^2) \qquad (2)$$

where d, T and R represent the thickness, transmittance, and reflectance of the films, respectively. Exponent n takes 2 because α-Fe_2O_3 is an indirect optical transition material. Fig. S3 shows the $(\alpha h\nu)^{1/2}$ versus photon energy plot.

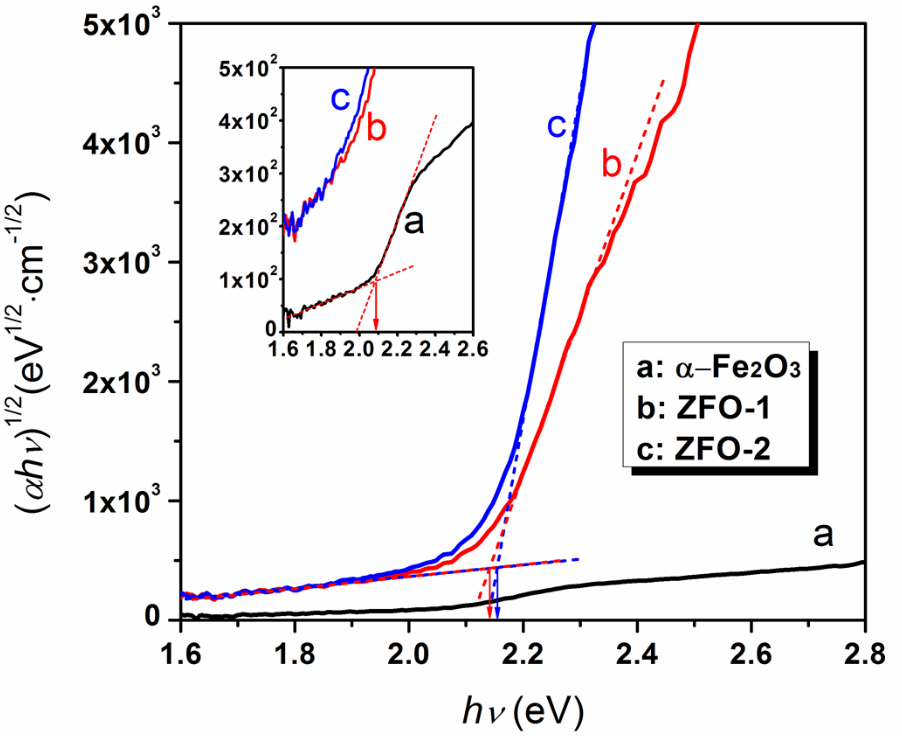

Fig. S3. Plots of $(\alpha h\nu)^{1/2}$ versus photon energy of pristine α-Fe_2O_3 and $ZnFe_2O_4$ modified α-Fe_2O_3 (ZFO-1 and ZFO-2) nanorod films.

References

1. J.-W. Lee, J.-H. Im and N.-G. Park, *Nanoscale*, 2012, 4, 6642–6648.
2. R. Bhattacharya, *J. Electrochem. Soc.*, 1983, 130, 2040–2042.