

Electronic Supplementary Information

Rapid Fabrication of Oxygen Defective α -Fe₂O₃(110) for Enhanced Photoelectrochemical Activities

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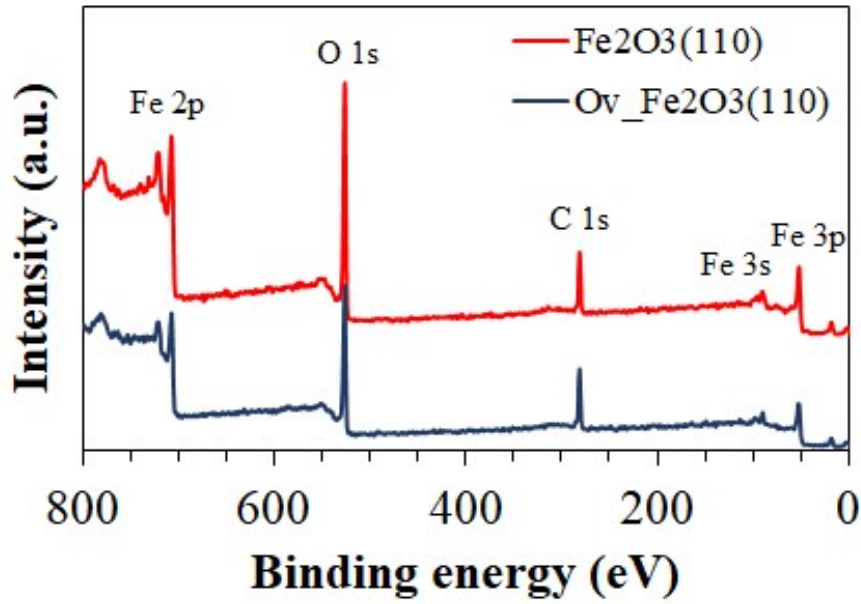


Figure S1. XPS survey spectra of $\text{Fe}_2\text{O}_3(110)$ and $\text{O}_V\text{-Fe}_2\text{O}_3(110)$.

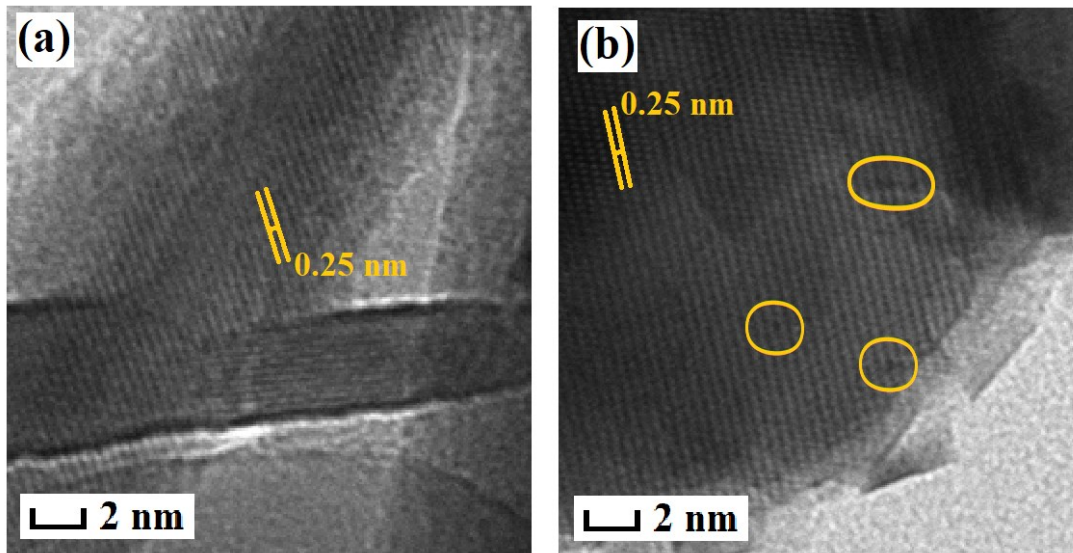


Figure S2. TEM images of (a) $\text{Fe}_2\text{O}_3(110)$ and (b) $\text{O}_V\text{-Fe}_2\text{O}_3(110)$. The circles show the presence of oxygen vacancies in crystal lattice.

Crystallite size calculation

The following Scherrer equation was used for the calculation of crystallite size, D :

$$D = \frac{K\lambda}{\beta \cos \theta} \quad (\text{Eq. S1})$$

where K is the shape factor with a value of 0.9, λ is the wavelength of X-ray, β is the full-width at half maximum (FWHM) of the XRD peak and θ is the Bragg angle.

Transient time calculation

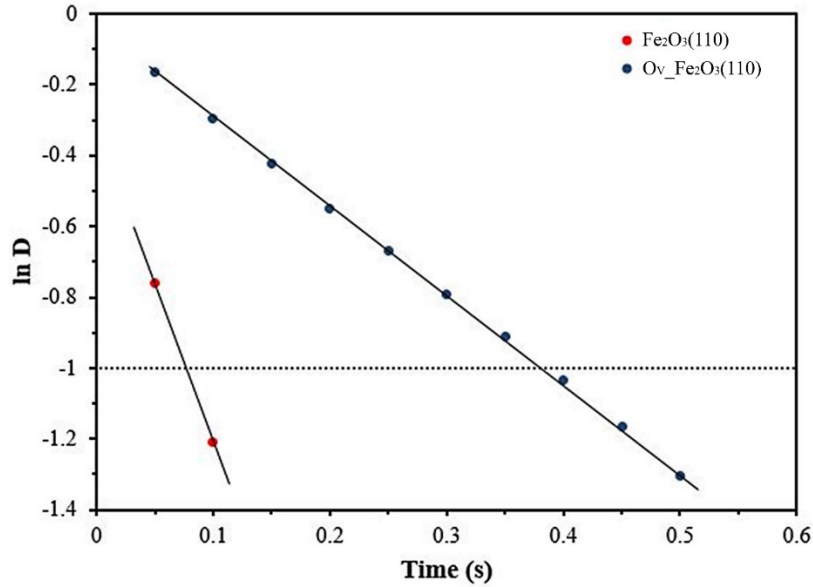


Figure S3. Ln D vs. time graph for the determination of transient time of Fe₂O₃(110) and O_v-Fe₂O₃(110) samples.

Figure S2 was derived from Figure 5(b) using the following equations:

$$D = \frac{I_t - I_f}{I_i - I_f} \quad (\text{Eq. S2})$$

$$\tau = -t \ln D \quad (\text{Eq. S3})$$

where τ is the transient time constant at which $\ln D = -1$; I_t is the current at time t ; I_i and I_f are the initial current (i.e. maximum current right after light is on) and final current (i.e. minimum current right before light is off), respectively.

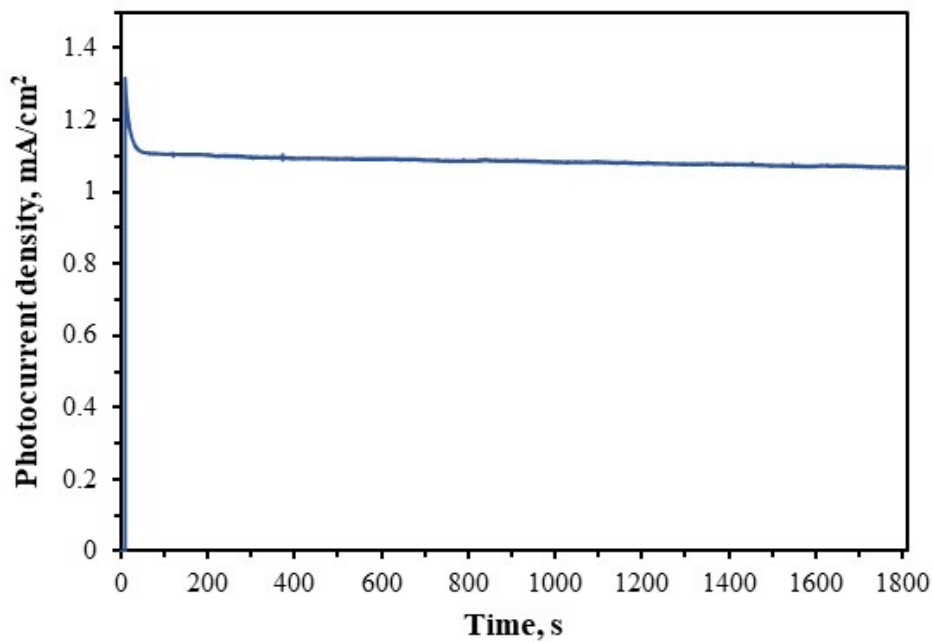


Figure S4. Current-time ($I-t$) graph of photoelectrochemical cells for $O_v\text{-Fe}_2\text{O}_3(110)$ photoanode measured at $1.2\text{ V}_{\text{Ag/AgCl}}$ bias voltage under light illumination.

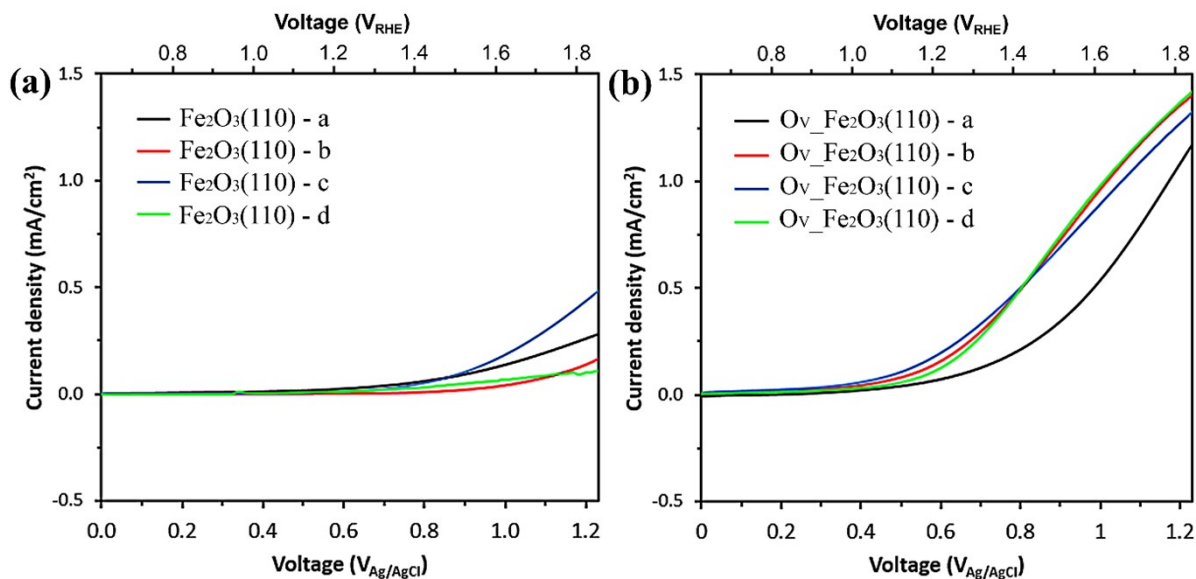


Figure S5. Photoelectrochemical performance of four different samples of (a) $\text{Fe}_2\text{O}_3(110)$ and (b) $O_v\text{-Fe}_2\text{O}_3(110)$ measured from front under light illumination.

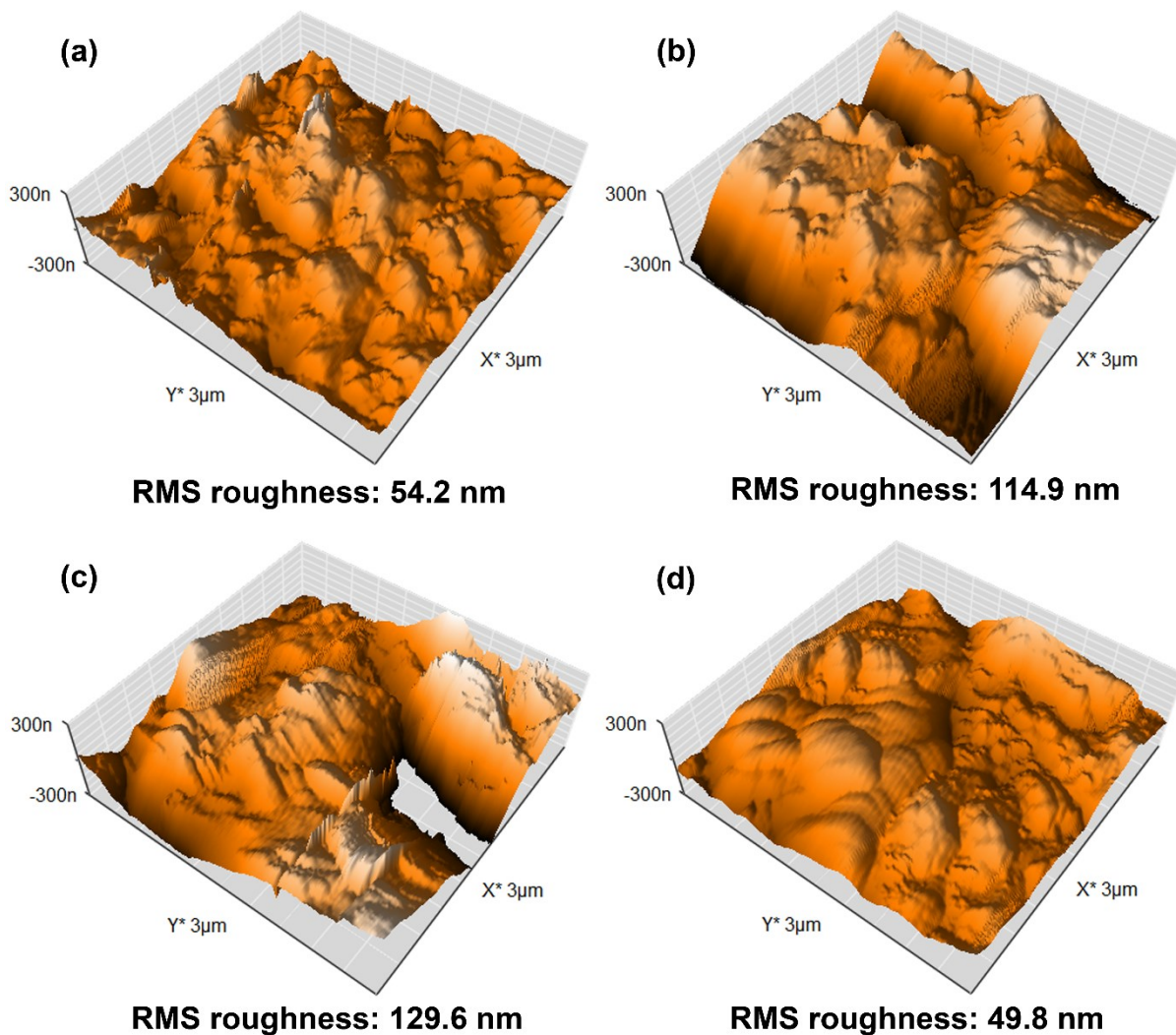


Figure S6. AFM images of $\text{Fe}_2\text{O}_3(110)$ film deposited via AACVD for (a) 10 min, (b) 20 min, (c) 40 min and (d) 60 min.

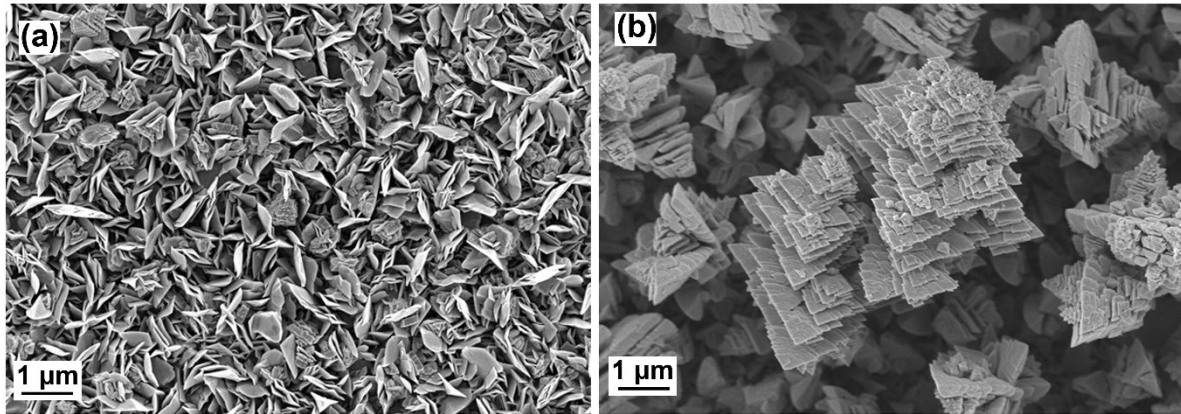


Figure S7. FESEM images of $\text{Fe}_2\text{O}_3(110)$ deposited for (a) 10 min and (b) 40 min. Prolonging the deposition time converts the structure of $\alpha\text{-Fe}_2\text{O}_3$ film from nanoflakes to nanoflowers.