

Support information

Facile synthesis of $\text{CoO}_x@\text{C}/\text{Ti-Fe}_2\text{O}_3$ photoanode for efficient photoelectrochemical water oxidation

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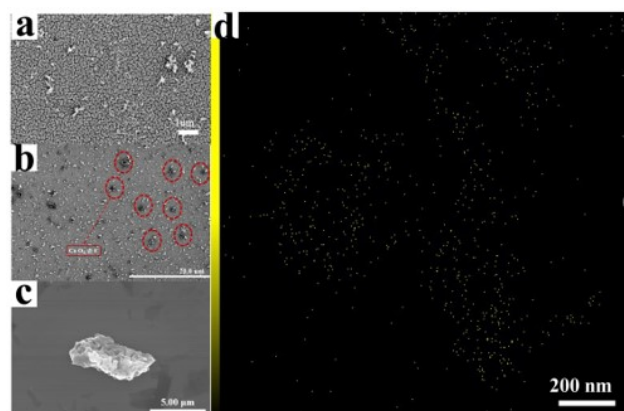


Fig. S1. SEM images of (a) Ti-Fe₂O₃, (b) CoO_x@C/Ti-Fe₂O₃, (c) CoO_x@C, (d) EDS elemental mapping of Ti of CoO_x@C/Ti-Fe₂O₃.

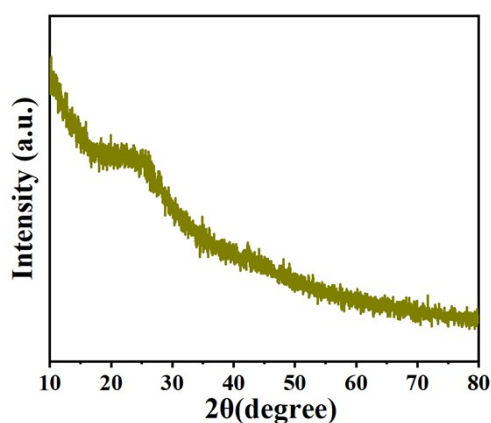


Fig. S2. XRD pattern of CoO_x@C.

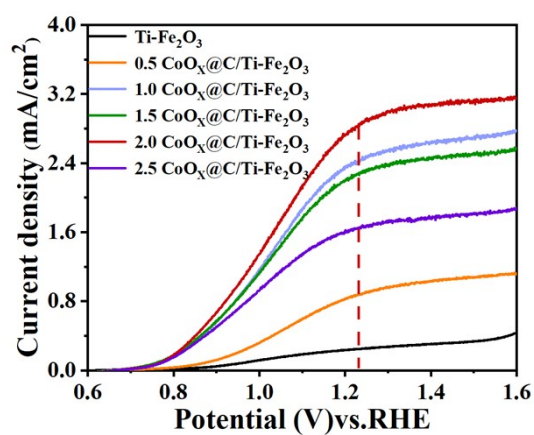


Fig. S3. LSV curves of CoO_x@C/Ti-Fe₂O₃ photoanodes with different cobalt-contents.

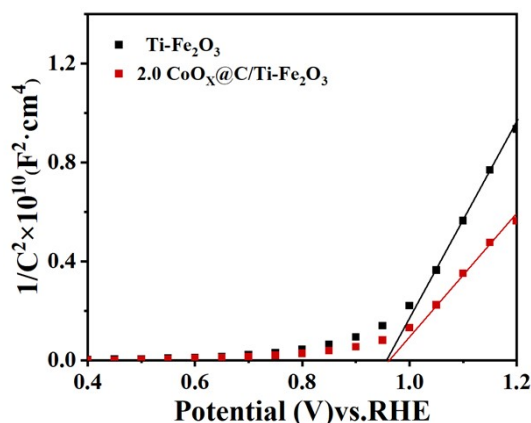


Fig. S4. Mott-Schottky curves for the Ti-Fe₂O₃ and CoO_x@C/Ti-Fe₂O₃ photoanodes.

The Mott-Schottky plots of Ti-Fe₂O₃ and 2.0 CoO_x@C/Ti-Fe₂O₃ were shown in Fig. S4. The slope in Fig. S4 can be used to calculate the carrier density, and it can be seen that the carrier concentration of 2.0 CoO_x@C/Ti-Fe₂O₃ was significantly better than that of Ti-Fe₂O₃. The increasing in carrier density mainly came from the high conductivity of CoO_x@C, which thus allowed for a better transfer of charge and facilitated the efficiency of the separation of photogenerated carriers. And the slopes of the Mott Schottky diagram curves of the photoanodes were all positive, indicating that these photoanodes had the nature of n-type semiconductors.

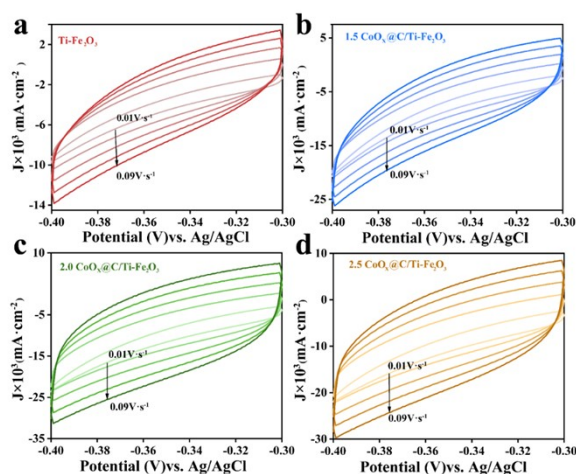


Fig. S5. CV curves of all photoanodes for the Ti-Fe₂O₃ and CoO_x@C/Ti-Fe₂O₃ photoanodes.

As can be seen in Fig. S5, the ECSA of the Ti-Fe₂O₃ and CoO_x@C/Ti-Fe₂O₃ electrodes the area of the CV curve increased gradually with the scan rate (0.01 ~ 0.09 V s⁻¹), and CoO_x@C/Ti-Fe₂O₃ can obtain a higher capacitance than Ti-Fe₂O₃. The large capacitance meant that CoO_x@C can capture more photogenerated carriers from Ti-Fe₂O₃.

Supplementary table

Table S1. Comparison of the photocurrent density of Ti-Fe₂O₃ and CoO_x@C/Ti-Fe₂O₃ under AM 1.5 G illumination

Table S1. EIS fitting results of Ti-Fe ₂ O ₃ , 1.5 Co@C/Ti-Fe ₂ O ₃ , 2.0 Co@C/Ti-Fe ₂ O ₃ and 2.5 Co@C/Ti-Fe ₂ O ₃ photoanodes					
Photoanode	R _S (Ω)	R _{bulk} (Ω)	CPE1(F·cm ⁻²)	R _{ct} (Ω)	CPE2(F·cm ⁻²)
Ti-Fe ₂ O ₃	68.71	402.1	9.6476×10 ⁻⁶	2068	0.83469
1.5 Co@C/Ti-Fe ₂ O ₃	63.35	211.5	2.919×10 ⁻⁵	696.3	0.87179
2.0 Co@C/Ti-Fe ₂ O ₃	81.85	163.5	1.6924×10 ⁻⁵	251.7	0.85296
2.5 Co@C/Ti-Fe ₂ O ₃	102.2	714.9	3.5921×10 ⁻⁵	822.7	0.7006