

In-situ synthesis of Ti:Fe₂O₃/Cu₂O p–n junction for highly efficient photogenerated carriers separation

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1. Supplemental Figures

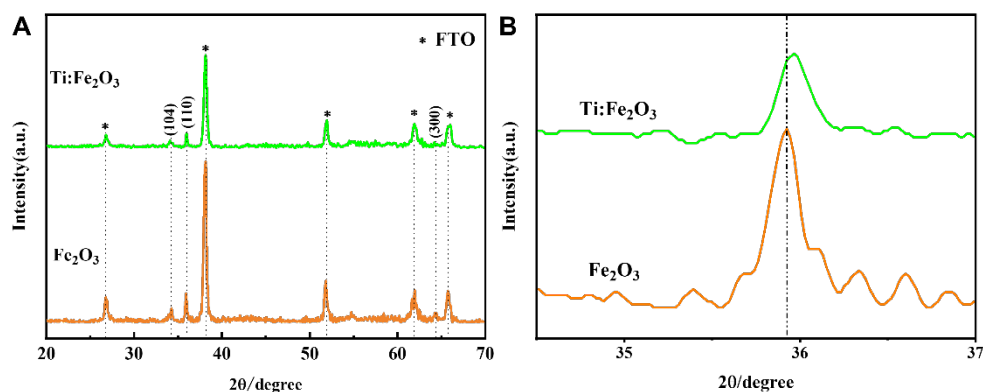


Figure S1. (A) XRD spectra of pure Fe₂O₃ and Ti:Fe₂O₃. (B) The enlarged XRD spectra of the (110)

peaks of Fe₂O₃ and Ti:Fe₂O₃.

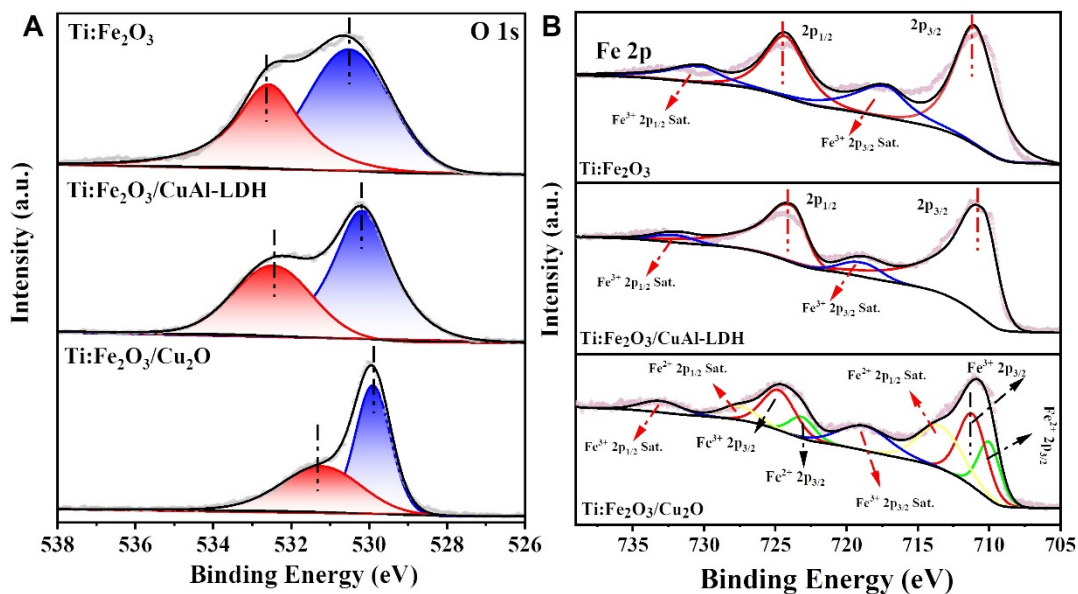


Figure S2. XPS spectra of Ti:Fe₂O₃, Ti:Fe₂O₃/CuAl-LDH and Ti:Fe₂O₃/Cu₂O: (A) O 1s, (B) Fe 2p

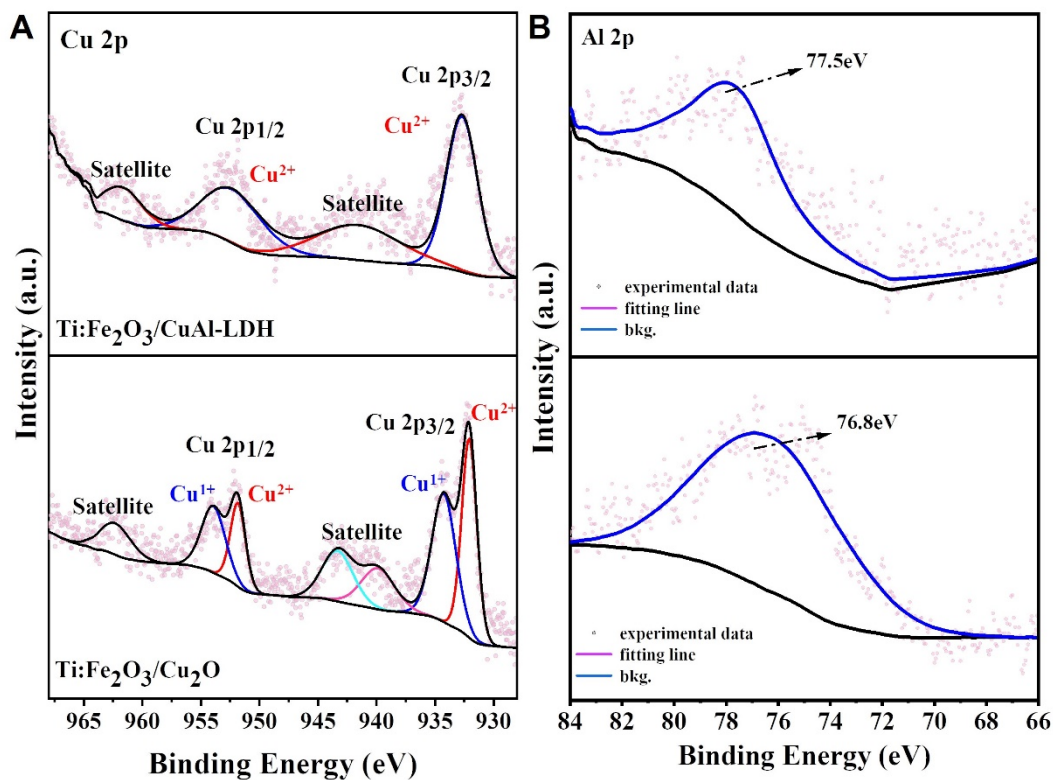


Figure S3. XPS spectra of Ti:Fe₂O₃/CuAl-LDH and Ti:Fe₂O₃/Cu₂O: (A) Cu 2p, and (B) Al 2p

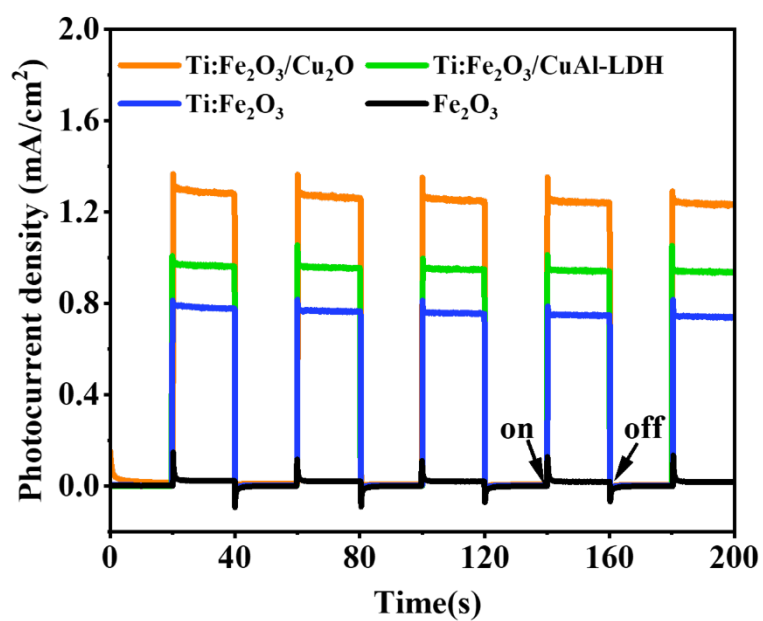


Figure S4. photocurrent density vs. time (I-T) curve

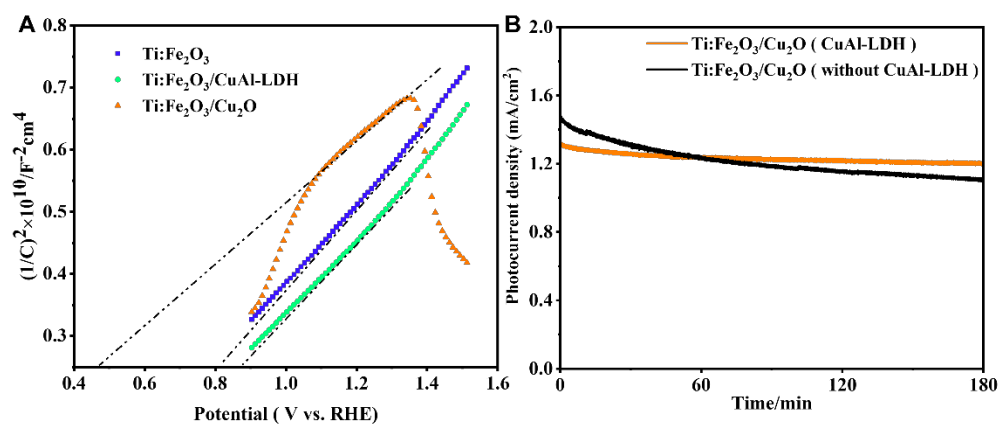


Figure S5. (A) M-S plots of Ti:Fe₂O₃, Ti:Fe₂O₃/CuAl-LDH, and Ti:Fe₂O₃/Cu₂O photoanode.

(B) Photoanode stability test

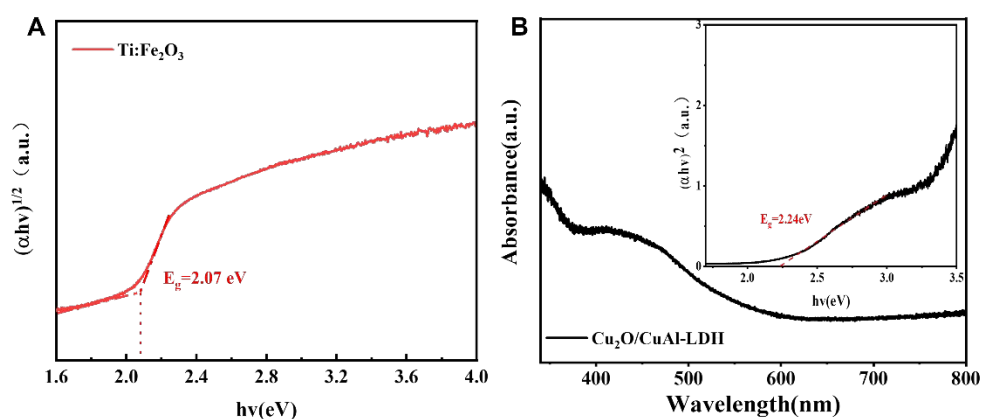


Figure S6. (A) plots of the $(\alpha h\nu)^{1/2}$ vs photon energy ($h\nu$) for $\text{Ti:Fe}_2\text{O}_3$. (B) UV-vis DRS (inset: plots of the $(\alpha h\nu)^2$ vs photon energy ($h\nu$) for $\text{CuAl-LDH/Cu}_2\text{O}$) of $\text{CuAl-LDH/Cu}_2\text{O}$

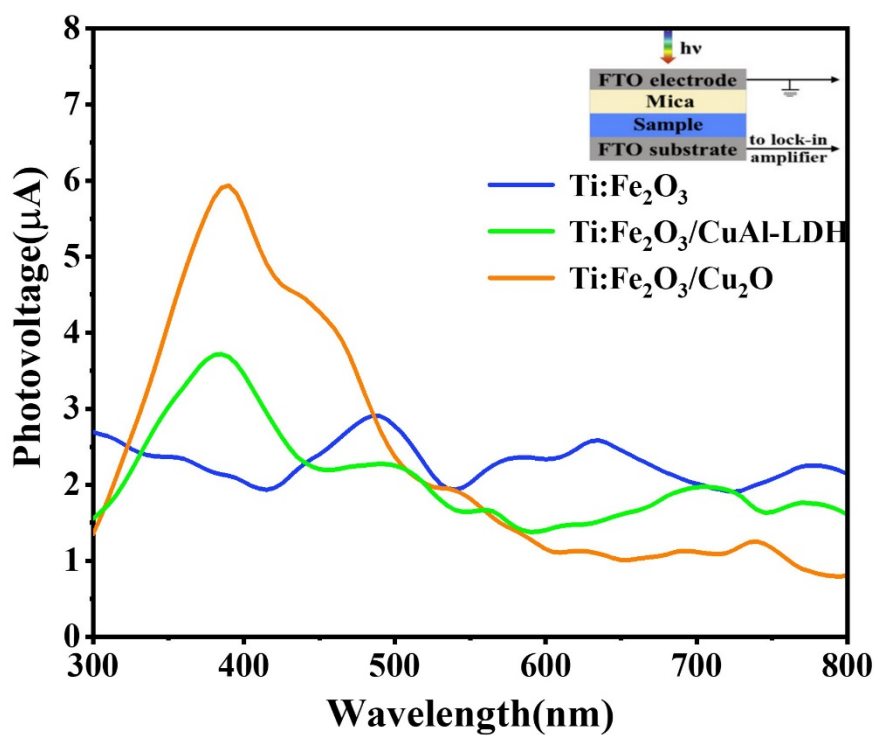


Figure S7. Surface photovoltage (SPV) plots, the insert in (a) is the SPV measurement configuration

Table S1 Comparison of Photocurrent density with other Fe₂O₃ materials

| No. | Samples | Photocurrent density(mA/cm ²) | | | Ref. |
|-----|--|--|---|-------|-----------|
| | | Before | After | Ratio | |
| 1. | Ti:Fe ₂ O ₃ /Cu ₂ O | Fe ₂ O ₃ 0.027 mA/cm ² (1.23V vs.RHE) | Ti:Fe ₂ O ₃ /Cu ₂ O 1.35 mA/cm ² (1.23V vs.RHE) | 50 | This work |
| 2. | Ti-Fe ₂ O ₃ /Cu ₂ O | Fe ₂ O ₃ 0.16 mA/cm ² (0.95V vs.SCE) | Ti-Fe ₂ O ₃ /Cu ₂ O 2.6 mA/cm ² (0.95V vs.SCE) | 16.25 | [1] |
| 3. | Fe ₂ O ₃ /Al ₂ O ₃ /CoO _x | Fe ₂ O ₃ 0.12 mA/cm ² (1.23V vs.RHE) | Fe ₂ O ₃ /Al ₂ O ₃ /CoO _x 2.23 mA/cm ² (1.23V vs.RHE) | 18.6 | [2] |
| 4. | Fh/Fe ₂ O ₃ | Fh/Fe ₂ O ₃ 0.18 mA/cm ² (1.23V vs.RHE) | Fh/Fe ₂ O ₃ 0.5 mA/cm ² (1.23V vs.RHE) | 2.78 | [3] |
| 5. | TiFe@NC-0.02 | TiFe 0.65 mA/cm ² (1.8 vs.RHE) | TiFe@NC-0.02 1.7mA/cm ² (1.8V vs.RHE) | 2.6 | [4] |
| 6. | CF-modified hematite | Hematite 0.53 mA/cm ² (1.23V vs.RHE) | CF-modified hematite 1.06 mA/cm ² | 2 | [5] |
| 7. | Fe ₂ TiO ₅ /Fe ₂ O ₃ /Pt | Fe ₂ O ₃ 0.5 mA/cm ² (1.23V vs.RHE) | Fe ₂ TiO ₅ /Fe ₂ O ₃ /Pt 1.0 mA/cm ² (1.23V vs.RHE) | 2 | [6] |

Reference

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