

Electronic Supporting Information

A Tandem Photoelectrochemical Water Splitting Cell Consisting of CuBi_2O_4 and BiVO_4 Synthesized from a Single $\text{Bi}_4\text{O}_5\text{I}_2$ Nanosheet Template

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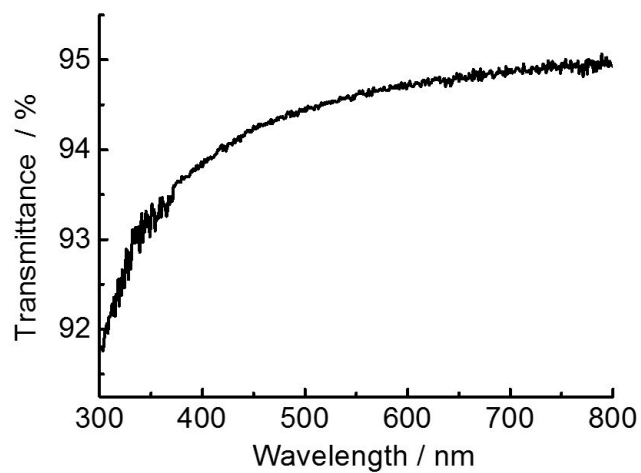


Figure S1. The UV-vis transmittance spectrum of Nafion 117™ membrane.

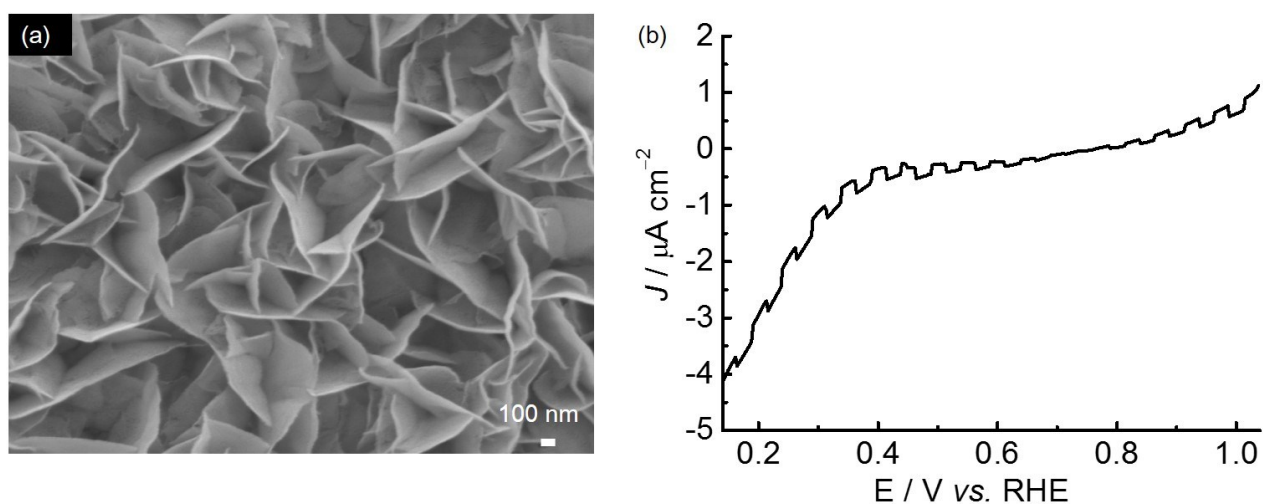


Figure S2. The SEM image (a) and (b) current density (J)–potential (E) curve of nanoBi₄O₅I₂. The J - E curve was recorded in an aqueous 0.1 M Bi buffer solution containing 0.5 M Na₂SO₄ (pH 9.2) under standardized and chopped solar-light illumination under N₂ atmosphere.

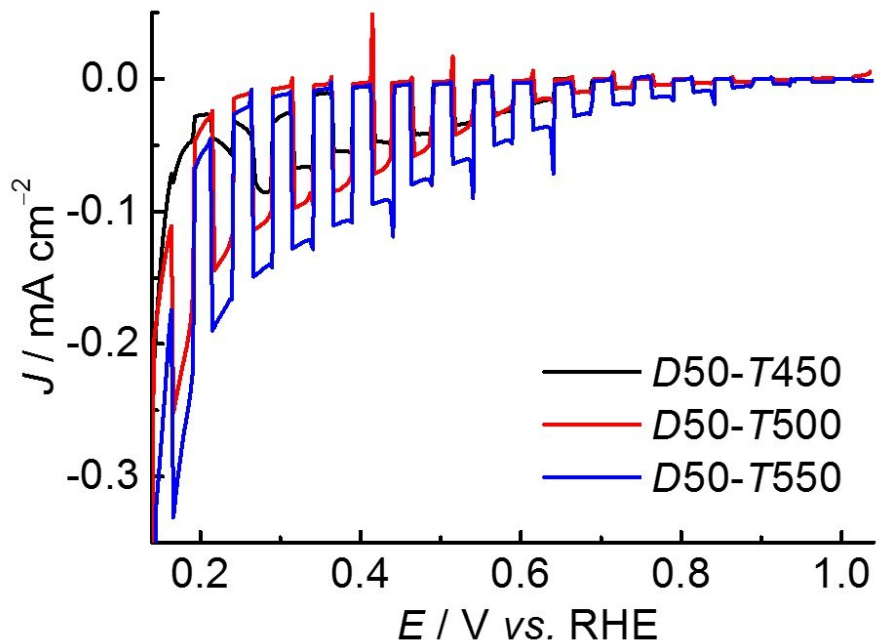


Figure S3. The J - E curves of the CuBi_2O_4 converted from $\text{nanoBi}_4\text{O}_5\text{I}_2$ with $D = 50 \mu\text{L cm}^{-2}$ and various T , recording in a 0.1 M B_i buffer solution containing 0.5 M Na_2SO_4 (pH 9.2) under chopped solar-light illumination (100 mW cm^{-2} , AM 1.5G) under N_2 atmosphere.

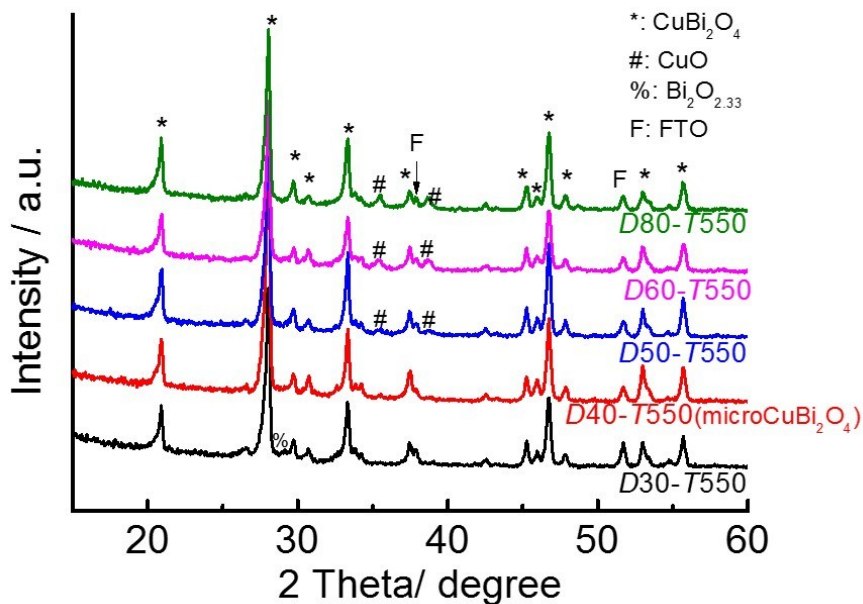


Figure S4. GI-XRD patterns of the CuBi_2O_4 converted from $\text{nanoBi}_4\text{O}_5\text{I}_2$ with various D at $T=550^\circ\text{C}$. The second phase of $\text{Bi}_2\text{O}_{2.33}$ and CuO exist if D is below and above $40 \mu\text{L cm}^{-2}$, respectively.

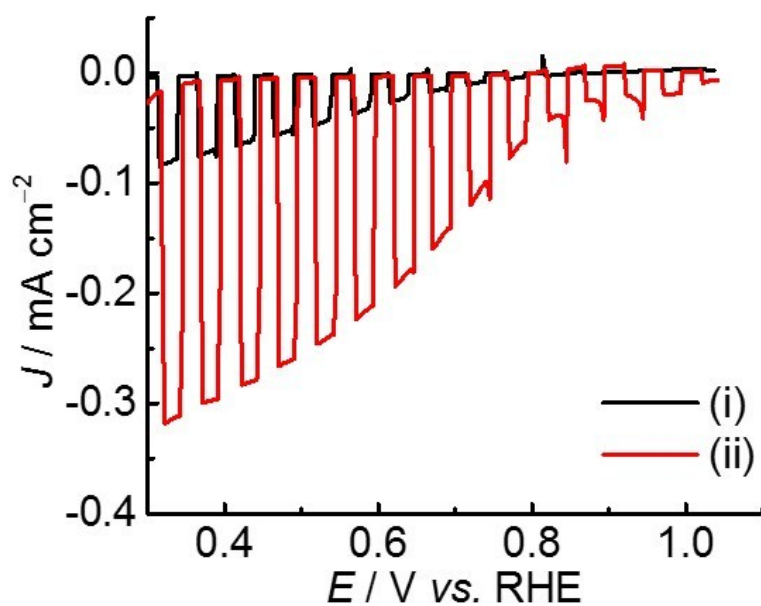


Figure S5. The J - E curve of microCuBi₂O₄ recorded in an aqueous (i) 0.1 M B_i buffer solution containing 0.5 M Na₂SO₄ (pH 9.2) and (ii) 1 M NaOH under chopped solar-light illumination (100 mW cm⁻², AM 1.5G) under N₂ atmosphere.

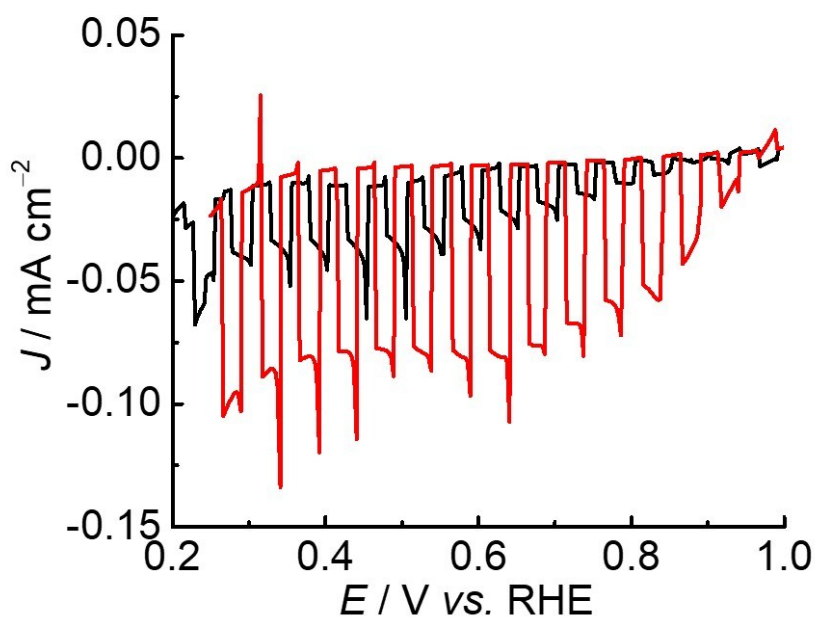


Figure S6. The J - E curve of a microCuBi₂O₄|Co-B_i recorded in an aqueous 0.1 M B_i buffer solution containing 0.5 M Na₂SO₄ (pH 9.2) under N₂ atmosphere with standardized solar-light illumination (100 mW cm⁻², AM 1.5G, red trace) and filtered by a nanoBiVO₄|Co-B_i electrode (black trace).

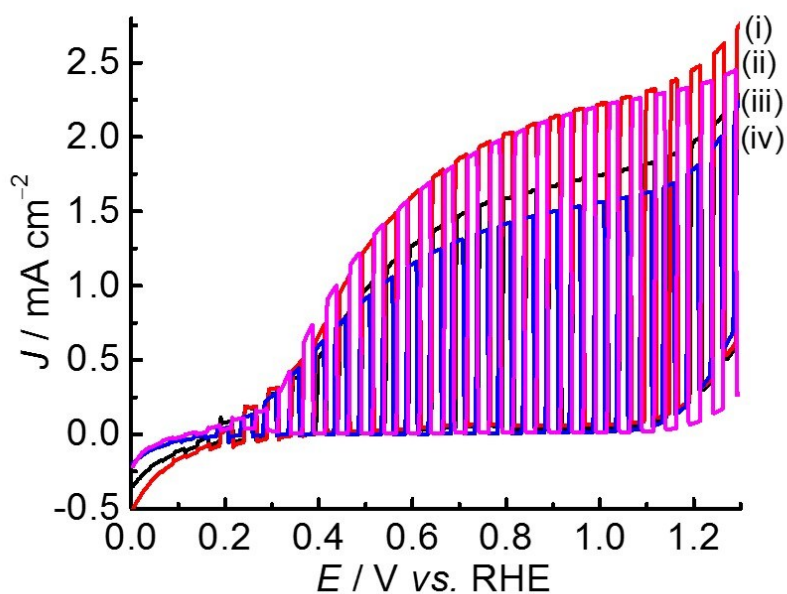


Figure S7. The J - E curve of BiVO_4 converted from $\text{nanoBi}_4\text{O}_5\text{I}_2$ with (i) $D=50 \mu\text{L cm}^{-2}$, (ii) $D=67 \mu\text{L cm}^{-2}$, (iii) $D=33 \mu\text{L cm}^{-2}$, and (iv) $D=83 \mu\text{L cm}^{-2}$, recording in an aqueous 0.1 M B_i buffer solution containing 0.1 M Na_2SO_3 (pH 9.2) under chopped solar-light illumination (100 mW cm^{-2} , AM 1.5G) under N_2 atmosphere.

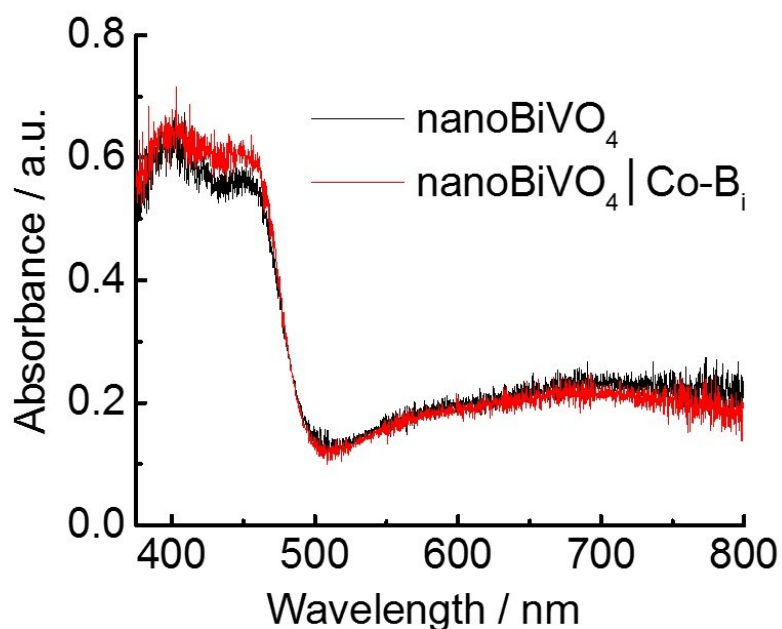


Figure S8. The UV-vis absorption spectra of nanoBiVO_4 and $\text{nanoBiVO}_4|\text{Co-B}_i$.

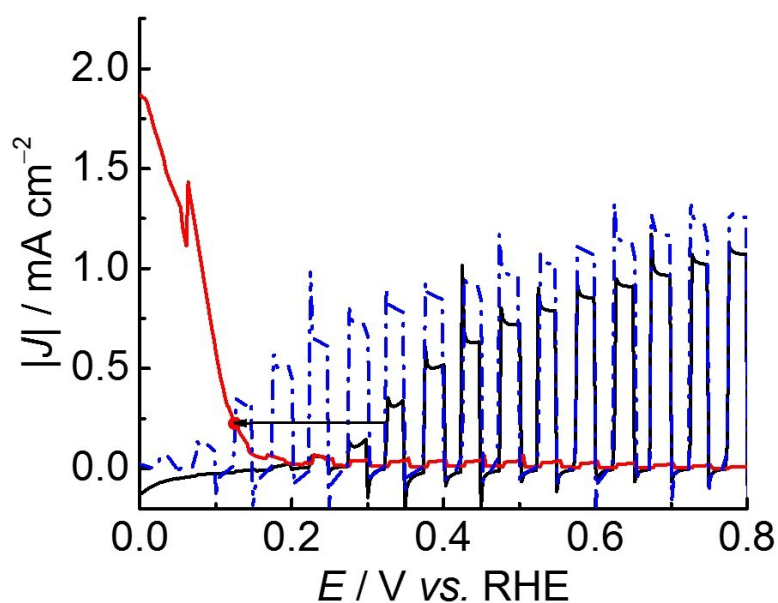


Figure S9. Overlaid $|J|$ - E curves of nanoBiVO₄|Co-Bi (black solid) under chopped solar light irradiation (100 mW cm⁻², AM 1.5G) and microCuBi₂O₄|Co-Bi placed in the tandem cell position (illumination was filtered by nanoBiVO₄|Co-Bi, red solid). The measurements were performed in a three-electrode system in an aqueous 0.1 M Bi buffer solution containing 0.5 M Na₂SO₄ (pH 9.2). An Ag/AgCl/KCl_{sat} electrode was used as the reference electrode, and a platinum foil as the counter electrode. A virtual curve (blue dash dot) shows a 0.2 V cathodic shift of the photocurrent curve of nanoBiVO₄|Co-Bi, and that an operating photocurrent of approximately 0.25 mA cm⁻² (red circle) should be obtained if an external bias of 0.2 V is applied to the BiVO₄- CuBi₂O₄ tandem cell. The nanoBiVO₄|Co-Bi and the microCuBi₂O₄|Co-Bi electrodes have a same exposed geometrical surface area of 0.5 cm².