Supporting information for

Efficient hydrogen production from MIL-53(Fe) catalyst-modified Mo: BiVO₄ photoelectrodes

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Experimental Section

Preparation of 2%Mo:BiVO₄-FeOOH composite materials.

The 2%Mo:BiVO₄-FeOOH photoanode was prepared by photoelectron-deposition [1]. The experimental process was carried out in 0.1 M FeSO₄•7H₂O solution while gently stirring. Prior to the photoelectron-deposition of FeOOH, the solution was purged with nitrogen gas for 1 h. An three-electrode cell was used that was composed of a 2% Mo:BiVO₄ film as working electrode, a Pt as counter electrode, and a saturated calomel electrode (SCE) as reference electrode. The process was carried out at 0.1 V (vs. SCE) under a 300 W Xe arc lamp with an AM 1.5G filter for 10, 20 and 30 min, which were recorded as 2%Mo:BiVO₄/FeOOH-1, 2%Mo:BiVO₄/FeOOH-2 and 2%Mo:BiVO₄/FeOOH-3.

Reference


Supplemental Figures

![Supplemental Figure S1](image_url)  
**Figure S1.** The cross-sectional SEM image of the FMBV photoanode.
Figure S2. UV-vis absorption spectra of FMBV films with various amounts of prepared MIL-53(Fe).

Figure S3. XRD patterns of MIL-53(Fe), 2% Mo:BVO and FMBV films.
Figure S4. XPS of high resolution Fe 2p, C 1s, O 1s, Mo 3d, Bi 4f and V 2p spectra of the FMBV film.

Figure S5. FTIR spectra of MIL-53(Fe), 2% Mo:BiVO₄ and FMBV films.
**Figure S6.** Current-potential characteristics of the pure MIL-53(Fe) photoanode.

**Figure S7.** Water oxidation photocurrent $i$-$t$ curve for FMBV-2 photoanode measured up to 3600s at 1.0 V (vs. RHE) constant potential.
Figure S8. (A) Current-potential characteristics and (B) $i$-$t$ curves of BiVO$_4$ and BiVO$_4$-MIL-53(Fe) films.

Figure S9. (A) Current-potential characteristics, (B) $i$-$t$ curves, (C) electrochemical impedance spectra, and (D) the production of H$_2$ of 2% Mo:BiVO$_4$ and FMBV composite materials with different amounts of prepared MIL-53(Fe).
Figure S10. (A) Current-potential characteristics, (B) i-t curves, (C) electrochemical impedance spectra of 2% Mo:BiVO₄ and 2% Mo:BiVO₄/FeOOH films.

Figure S11. The H₂ and O₂ evolution volumes of the FMBV-2 photoanode at 1.23 V<sub>RHE</sub> at 0.2 M Na₂SO₄ electrolyte under AM 1.5G (100 mW cm⁻²) illumination.
Figure S12. Standard H\textsubscript{2} evolution curve.

The equation between the volume of H\textsubscript{2} and the corresponding peak area can be expressed as follows: $A \text{ (a.u.)} = 593.38905 \times V \text{ (μl)} - 1442.8$. 