

Electronic Supplementary Information

Photothermal-enhanced solar water oxidation on NiO/amorphous carbon/BiVO₄ and CoOx/amorphous carbon/BiVO₄ photoanodes

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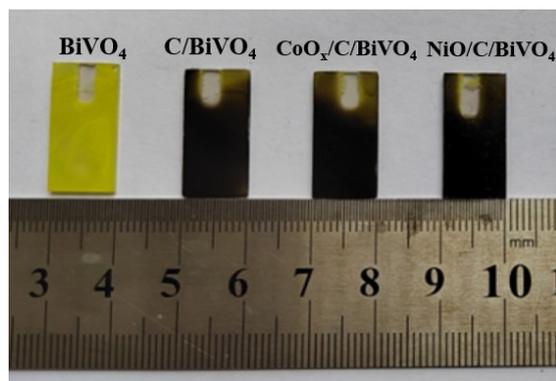


Fig. S1 Photographs of BiVO₄, C/BiVO₄, CoO_x/C/BiVO₄ and NiO/C/BiVO₄ film.

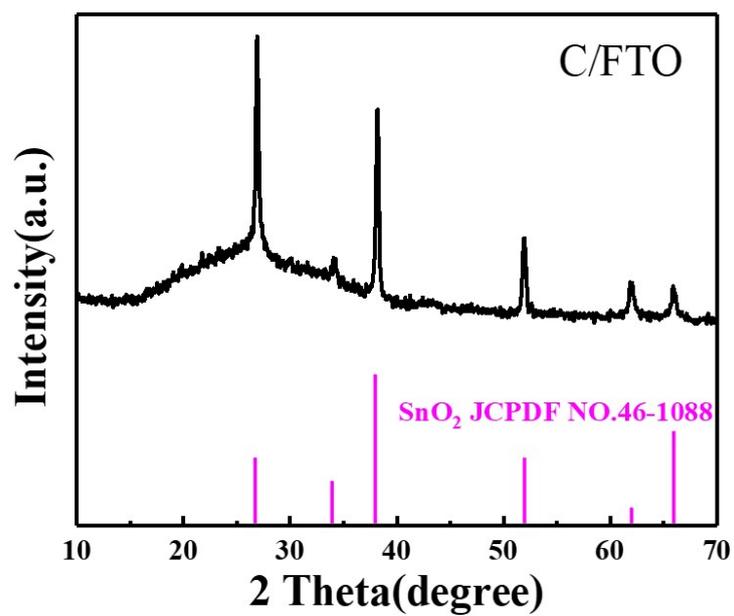


Fig. S2 XRD pattern of C/FTO film. The C/FTO film was prepared by the similar candle flame roasting approach for the preparation of NiO/C/BiVO₄ and CoO_x/C/BiVO₄ film.

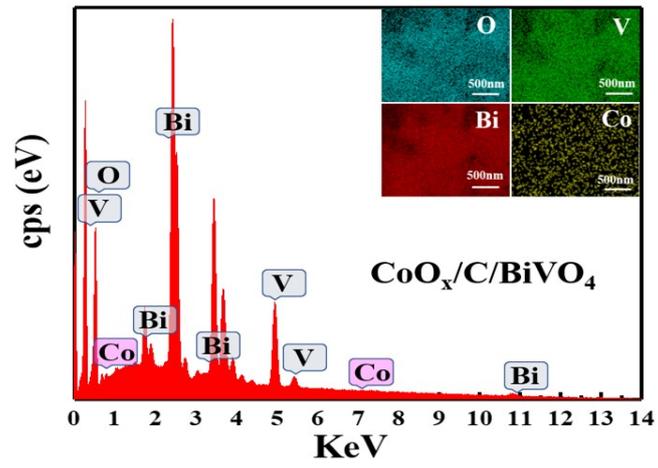


Fig. S3 The EDS signals collected from the $\text{CoO}_x/\text{C}/\text{BiVO}_4$ film.

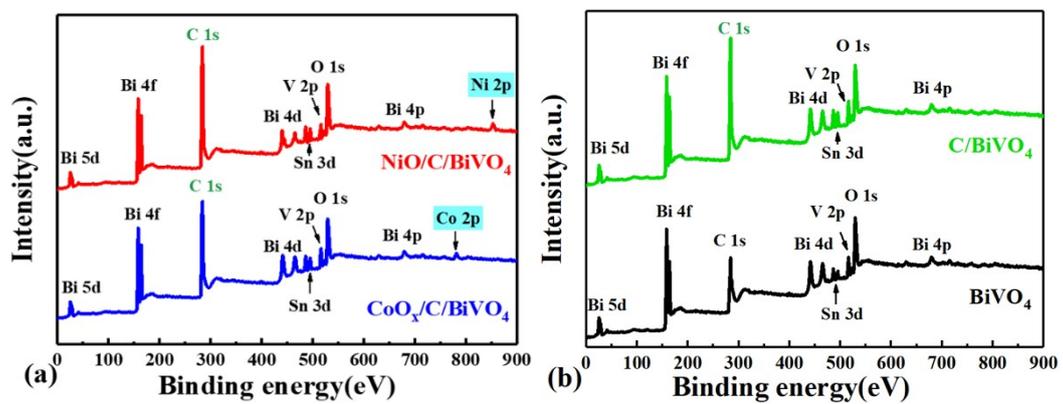


Fig. S4 Survey XPS spectrum of (a) CoO_x/C/BiVO₄ and NiO/C/BiVO₄, (b) BiVO₄ and C/BiVO₄ film.

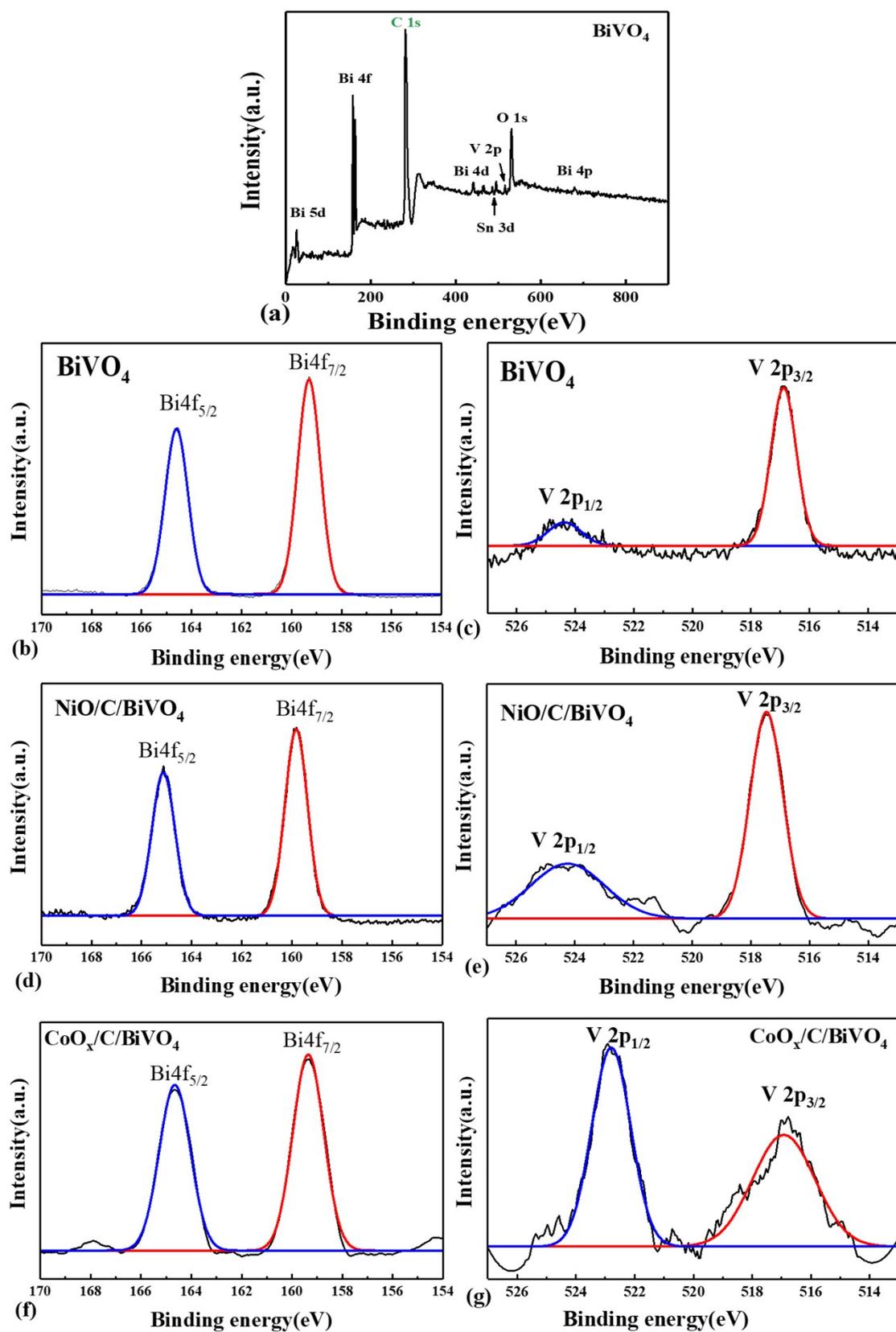


Fig. S5 (a) Survey XPS spectrum of BiVO_4 film. (b-g) High-resolution Bi 4f and V 2p XPS spectrum collected from BiVO_4 , NiO/C/BiVO_4 and $\text{CoO}_x/\text{C/BiVO}_4$ film.

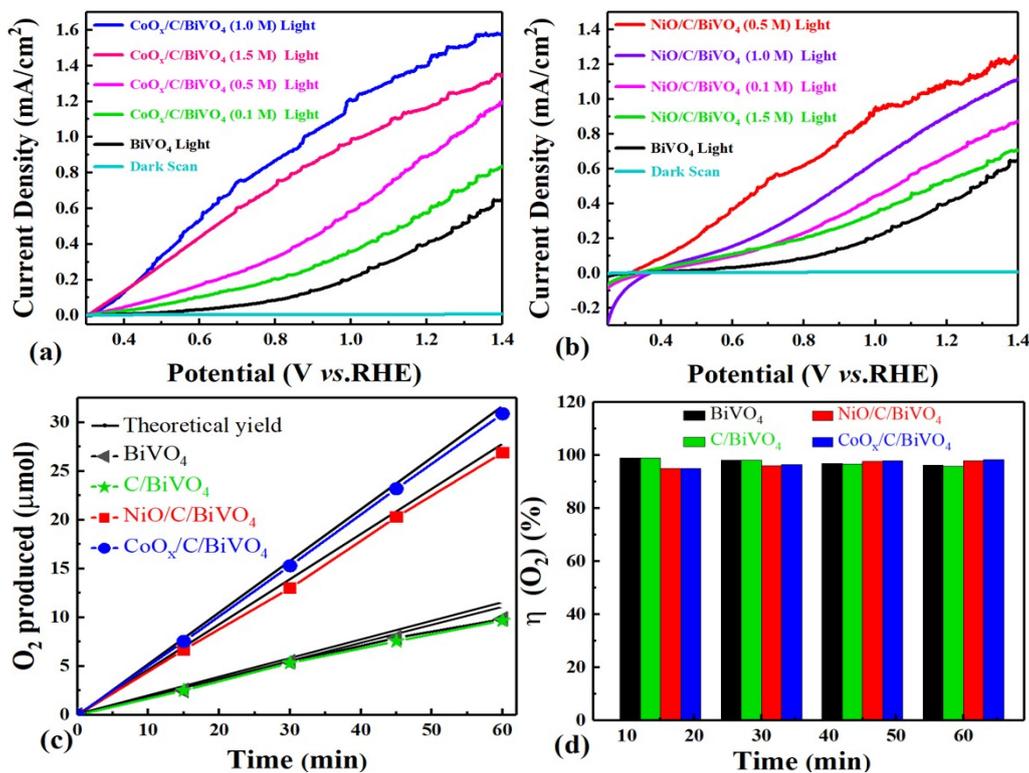


Fig. S6 LSV curves of the BiVO₄, (a) CoO_x/C/BiVO₄ and (b) NiO/C/BiVO₄ film in 0.1 M NaPi buffer under and without AM 1.5G irradiation. The CoO_x/C/BiVO₄ and NiO/C/BiVO₄ films were prepared using Ni²⁺- or Co²⁺-containing solution with different concentrations (0.1 M, 0.5 M, 1.0 M and 1.5 M). (c) The curves of O₂ generation vs. reaction time, and (b) faradic efficiency of oxygen evolution reaction for the BiVO₄, C/BiVO₄, CoO_x/C/BiVO₄ and (b) NiO/C/BiVO₄ film in 0.1 M NaPi buffer under AM 1.5G irradiation at 1.23 V vs. RHE.

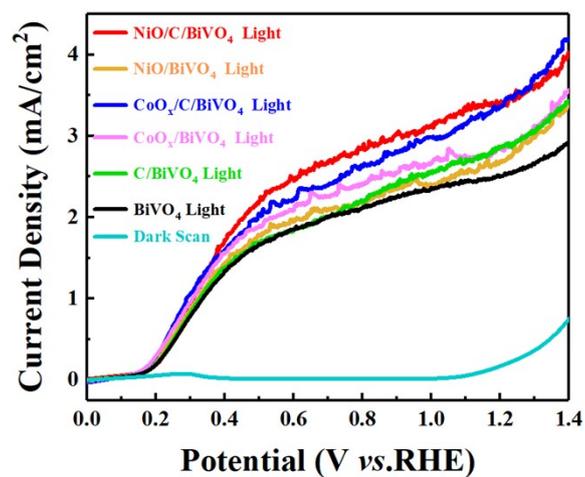


Fig. S7 LSV curves for BiVO₄, C/BiVO₄, NiO/BiVO₄, CoO_x/BiVO₄, NiO/C/BiVO₄ and CoO_x/C/BiVO₄ film in 0.1 M NaPi-1.0 M Na₂SO₃ under and without AM 1.5G irradiation, the scan rate was 15 mV/s.

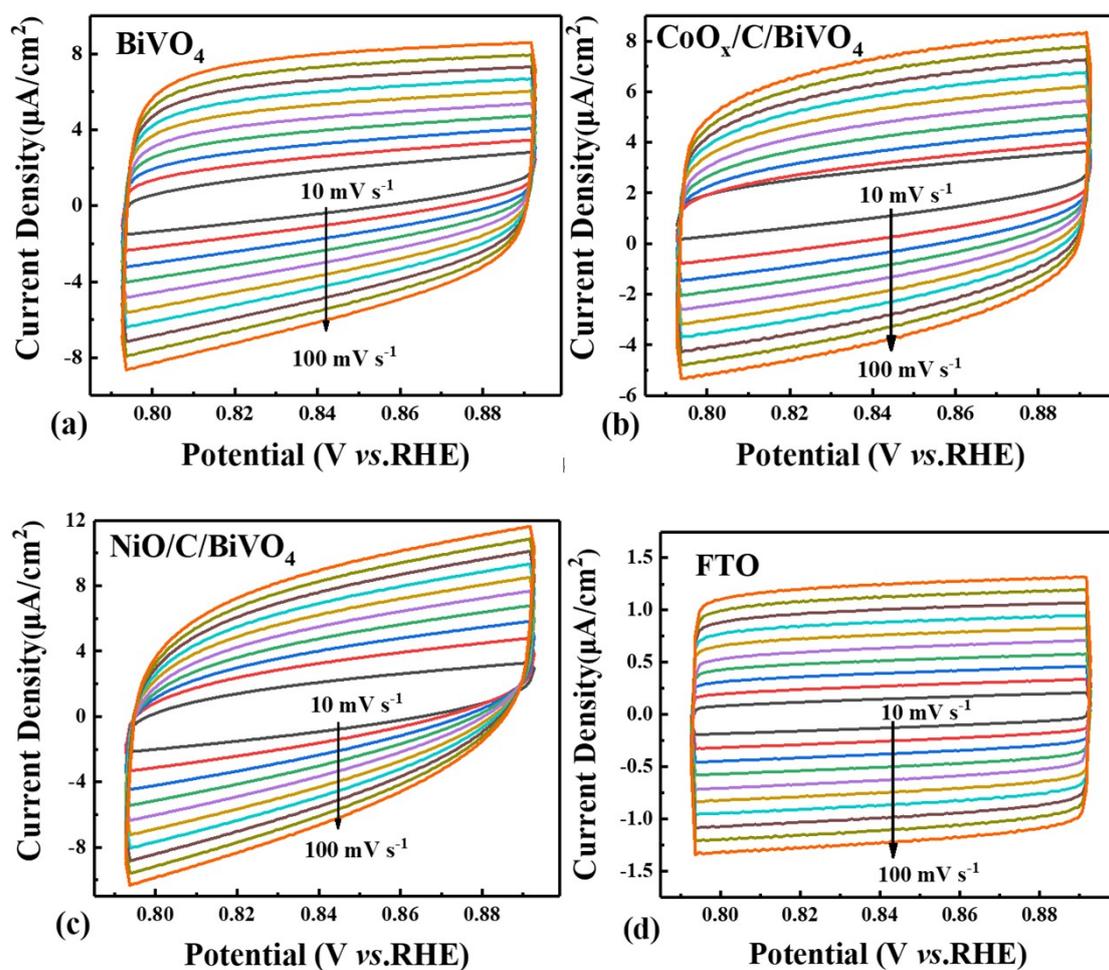


Fig. S8 The $\Delta I \sim \nu$ plots used for the calculation of double-layer capacitance (C_{dl}) for (a) BiVO_4 , (b) $\text{CoO}_x/\text{C}/\text{BiVO}_4$, (c) $\text{NiO}/\text{C}/\text{BiVO}_4$ and (d) FTO electrode at 0.85 V vs. RHE.

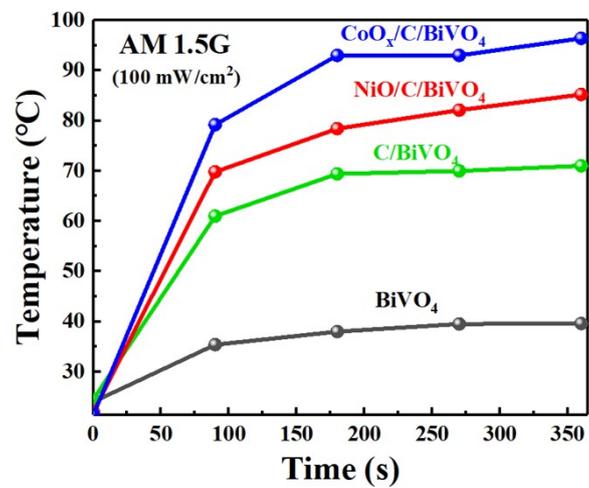


Fig. S9 The time-temperature curves of BiVO₄, C/BiVO₄, CoO_x/C/BiVO₄ and NiO/C/BiVO₄ film under AM 1.5G irradiation.

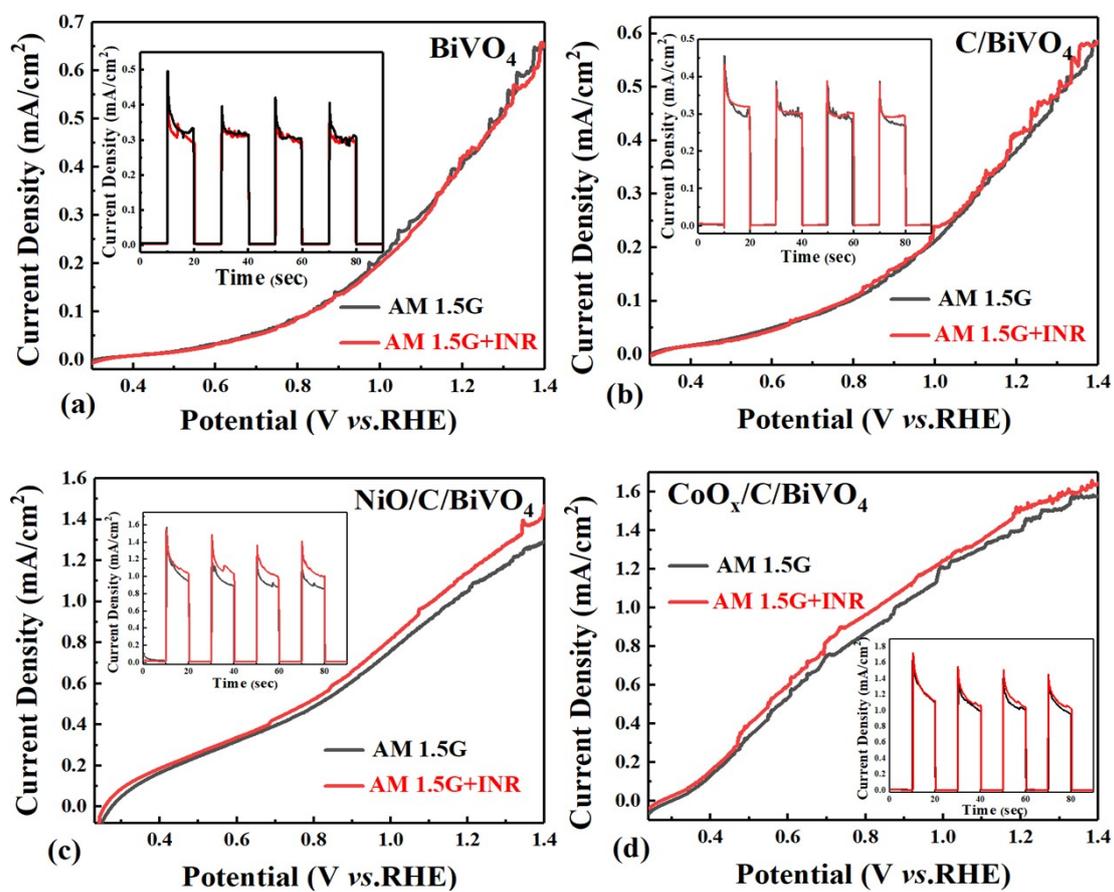


Fig.S10 LSV scans for (a) BiVO₄, (b) C/BiVO₄, (c) NiO/C/BiVO₄ and (d) CoO_x/C/BiVO₄ film electrodes in 0.1 M NaPi buffer under AM 1.5G/near infrared light irradiation (808 nm, 1W/cm²).

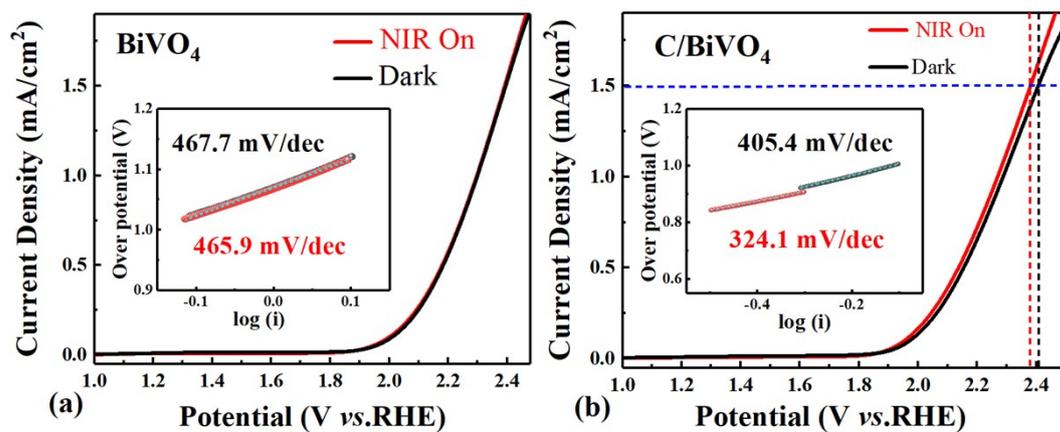


Fig. S11 LSV and Tafel curve of (a) BiVO_4 and (b) C/BiVO_4 film electrodes in 0.1 M NaPi buffer in dark condition with near infrared light irradiation (808 nm, $1\text{W}/\text{cm}^2$).