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Supporting Information

for

Glycerol photoelectrochemical oxidation reaction at carbon nitrides/$BiVO_4$ materials

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Additional figures

1 – Bandgap energy estimation

The Tauc equation is given by:

$$(\alpha h\nu)^{1/n} = (h\nu - E_g) \quad \text{(S1)}$$

in which α is the absorption coefficient (proportional to the absorbance), E_g is the optical bandgap energy, $h\nu$ is the energy of the incident photons, and n represents the type of electronic transition. Herein, n = 1/2 was used for direct allowed transitions and n = 2 for indirect allowed transitions.

2 – Experimental Setup

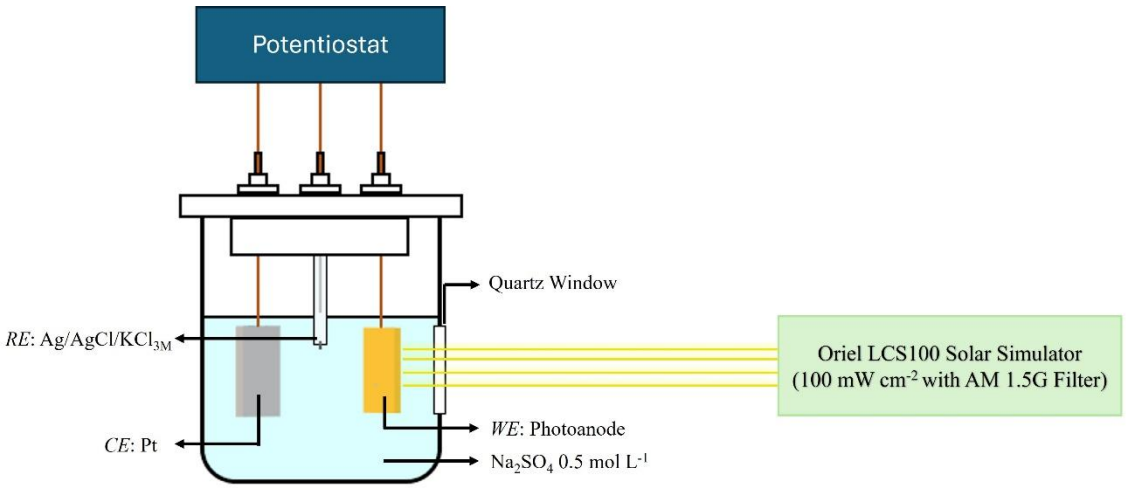

Figure S1: Experimental setup employed for photoelectrochemical experiments.

3 – Physical Characterization

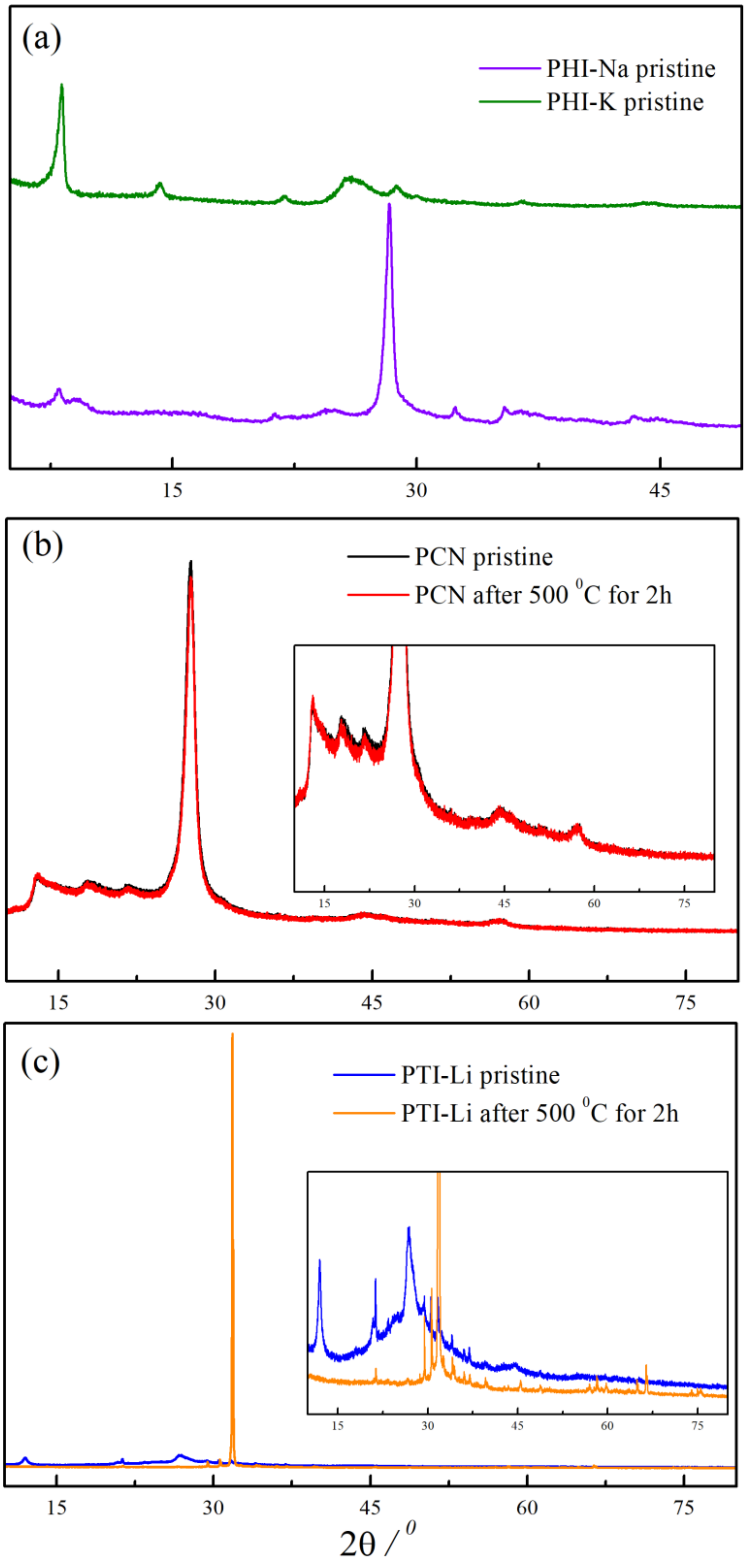

Figure S2: X-ray diffraction patterns for PHI-Na and PHI-K (a), PCN (b), and PTI-Li (c). PCN and PTI-Li XDR were analyzed for both pristine materials and after thermal treatment at 500 °C for 2 h.

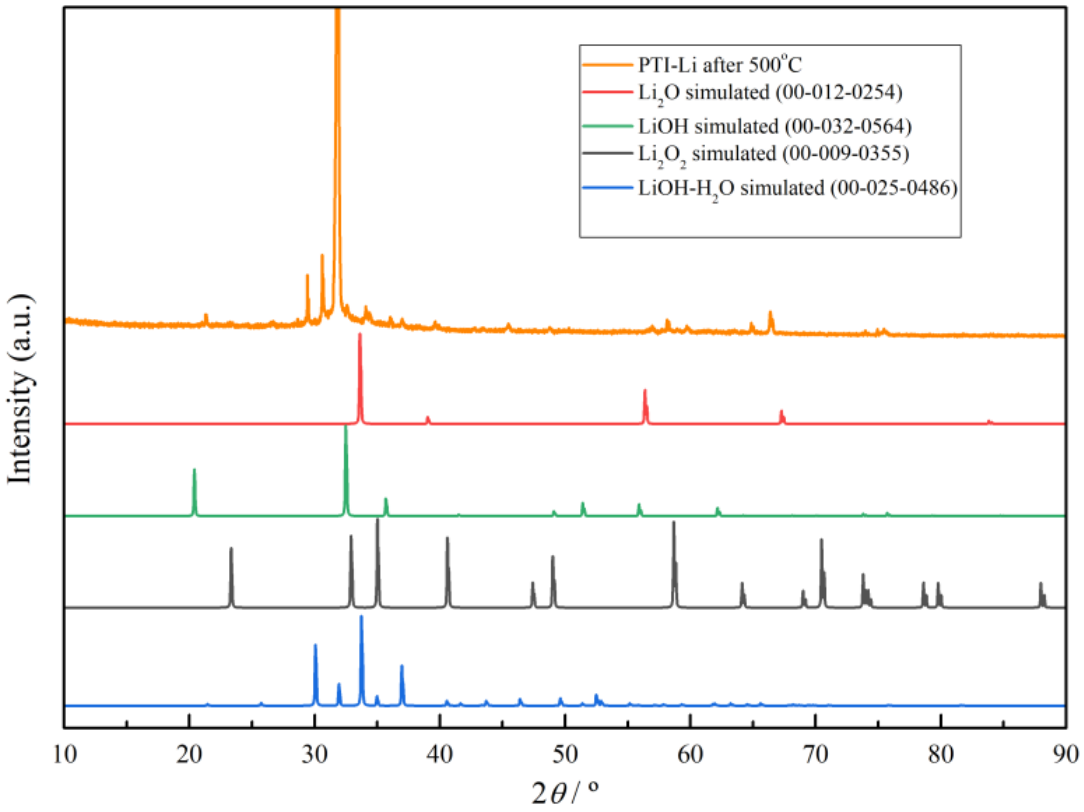

Figure S3: X-ray diffraction patterns for PTI-Li after thermal treatment at 500 °C for 2 h and for some lithium (hydro)oxides.

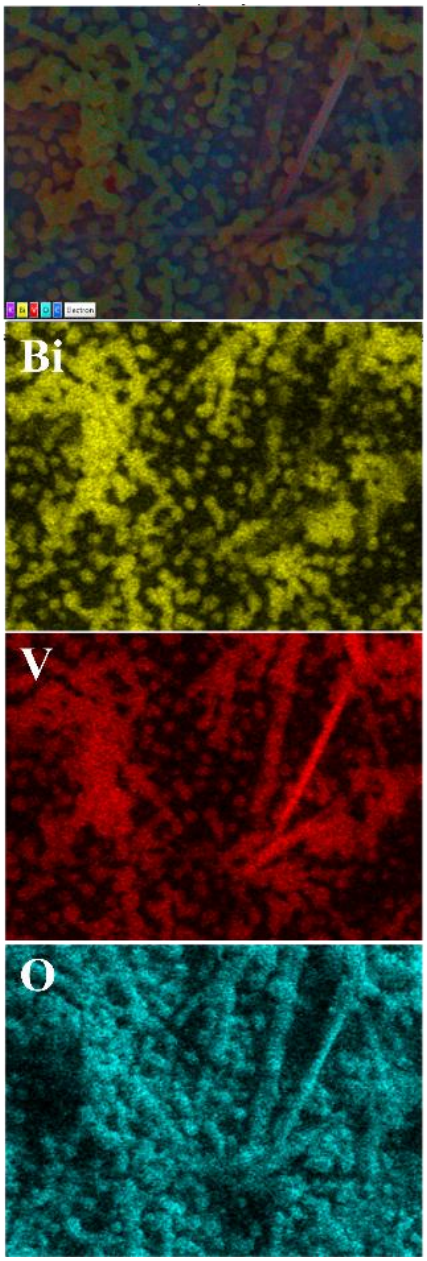

Figure S4: SEM-EDS for PTI-Li/$BiVO_4$.

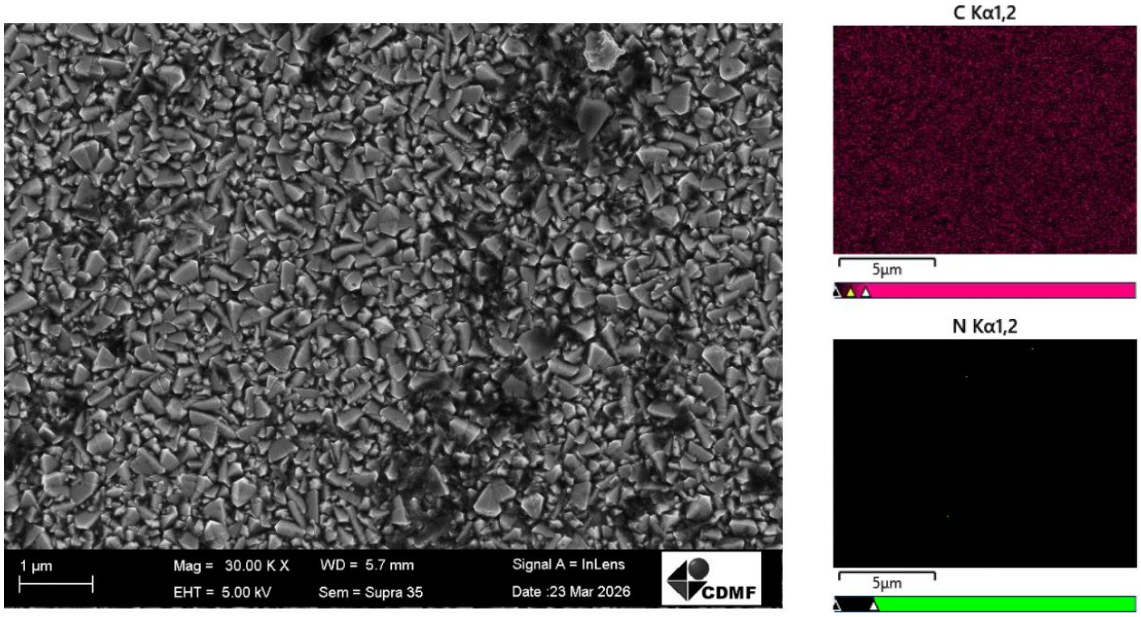

Figure S5: SEM images of PCN onto FTO (left) and carbon and nitrogen elemental mapping obtained by SEM/EDS (right).

4 – Electrochemical Characterization

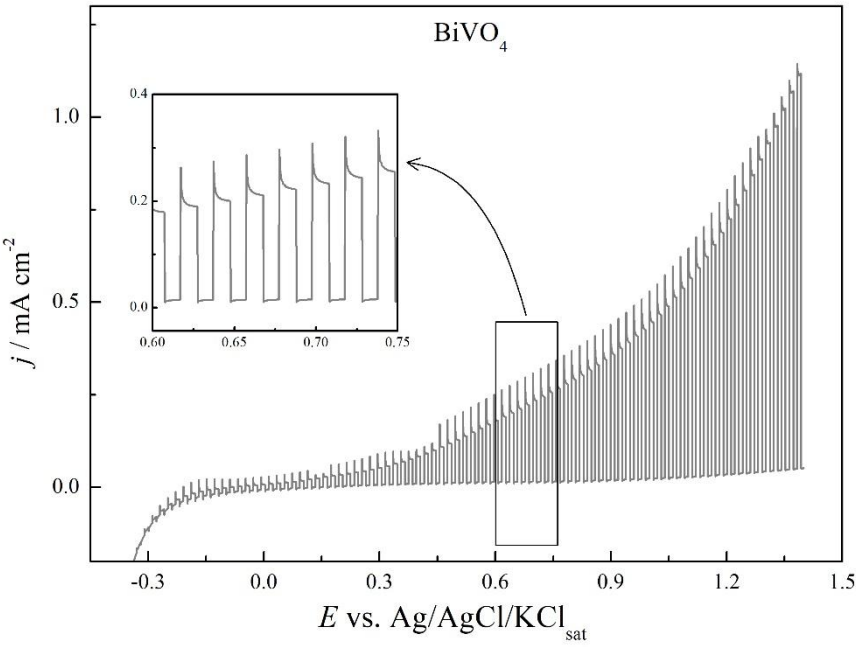

Figure S6: Linear sweep voltammetry (LSV) at 0.05 $V \cdot s^{-1}$ on chopped illumination for the $BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8).

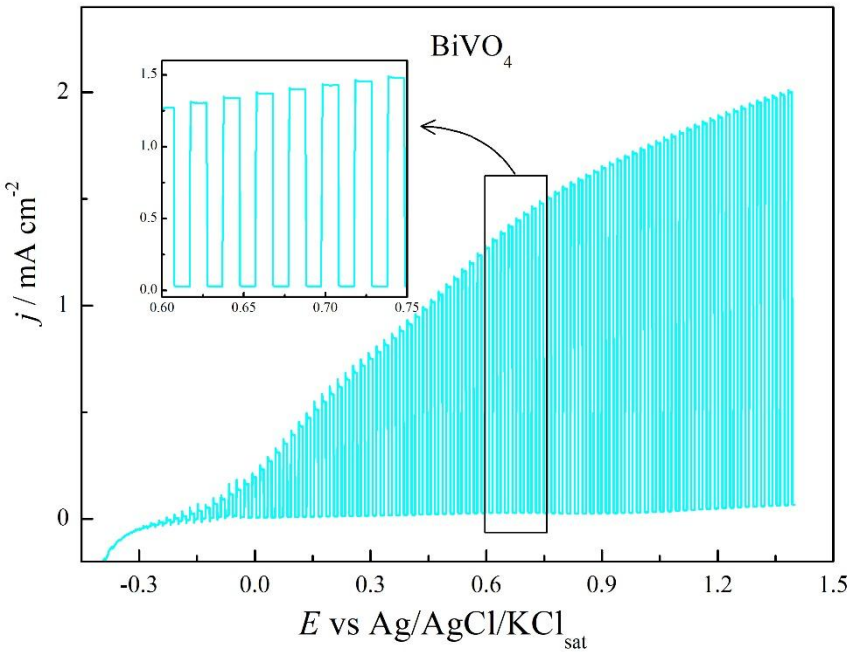

Figure S7: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for the $BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

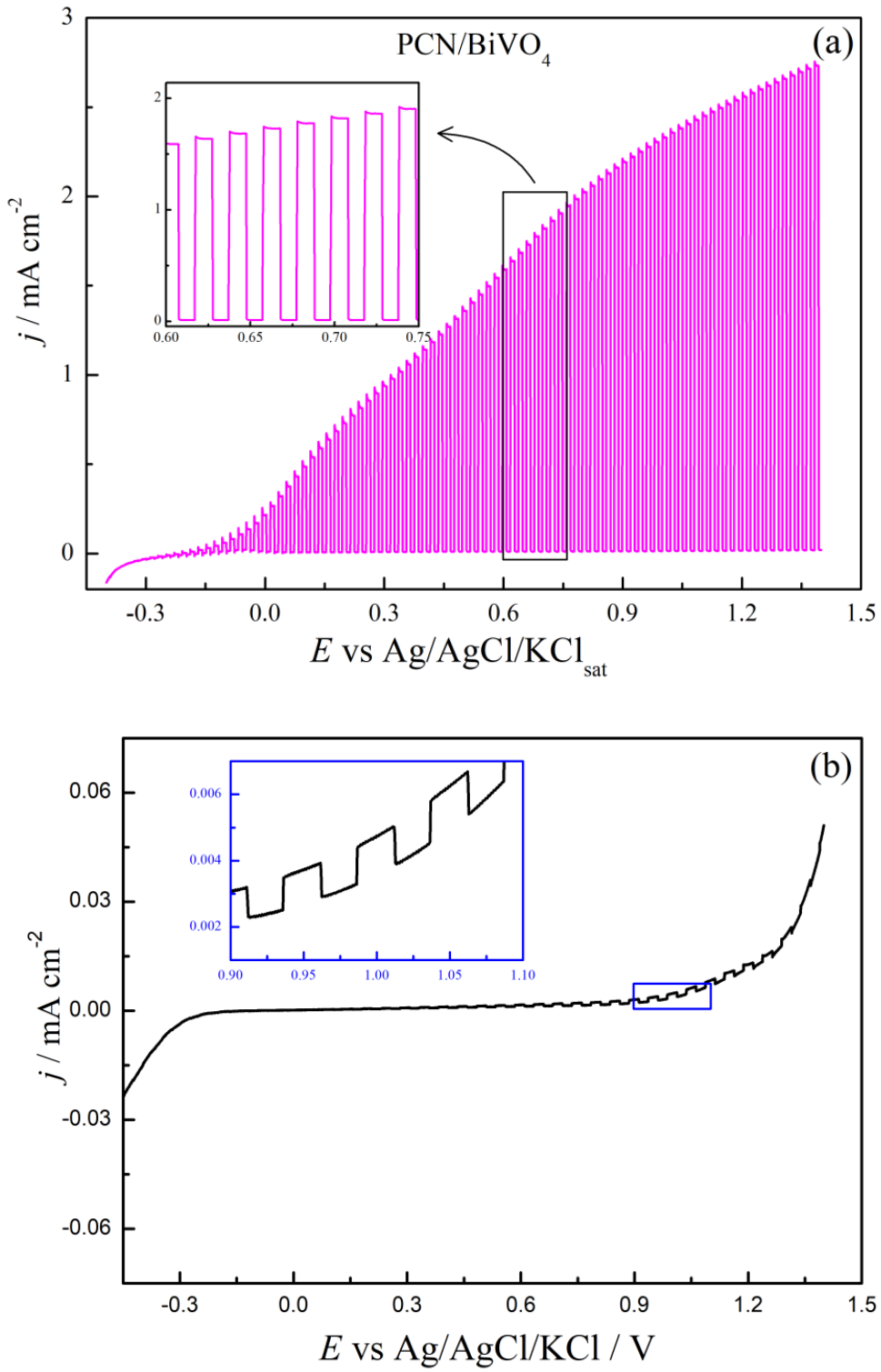

Figure S8: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for $PCN/BiVO_4$ (a) and for PCN films (b). Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

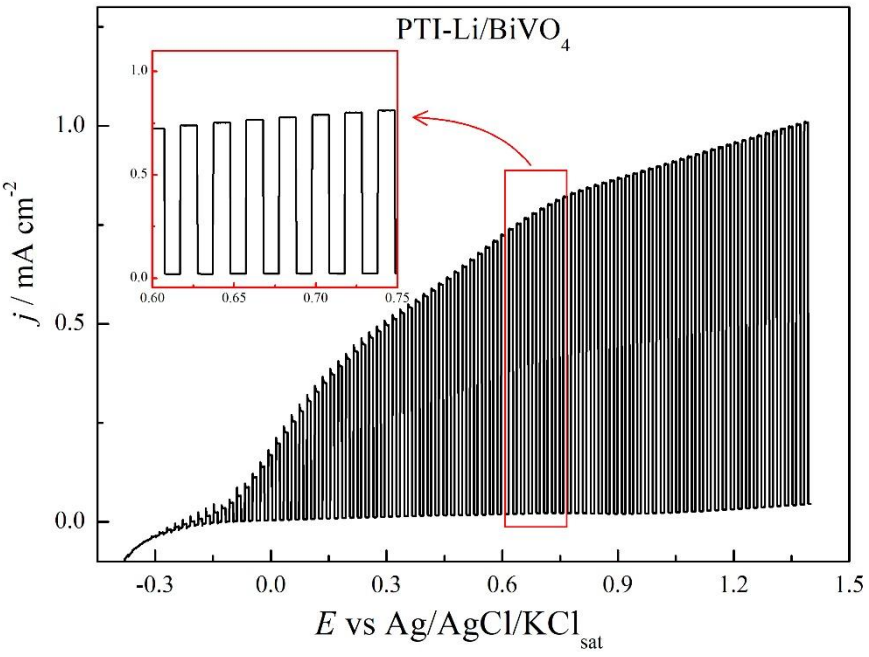

Figure S9: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for the PTI-Li/$BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

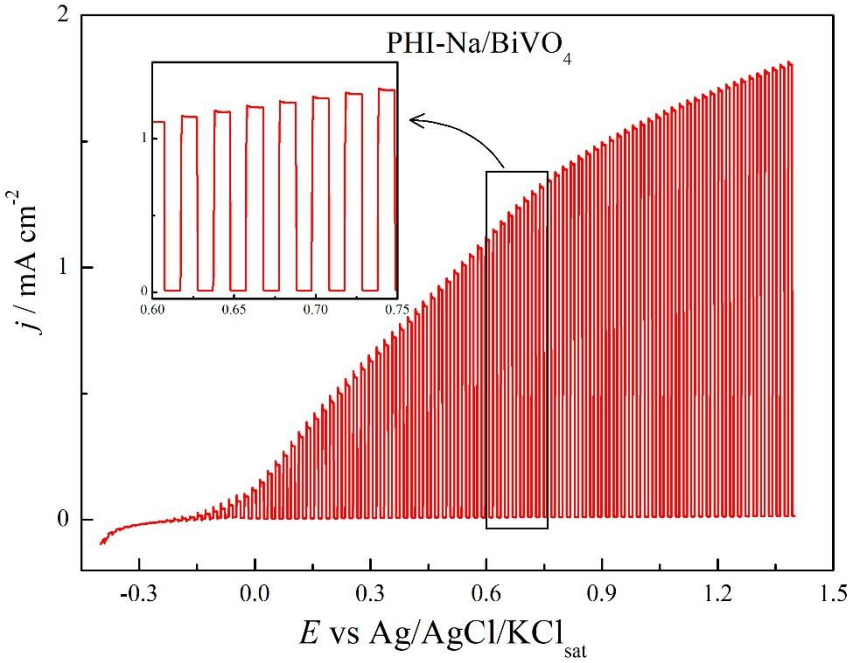

Figure S10: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for the PHI-Na/$BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

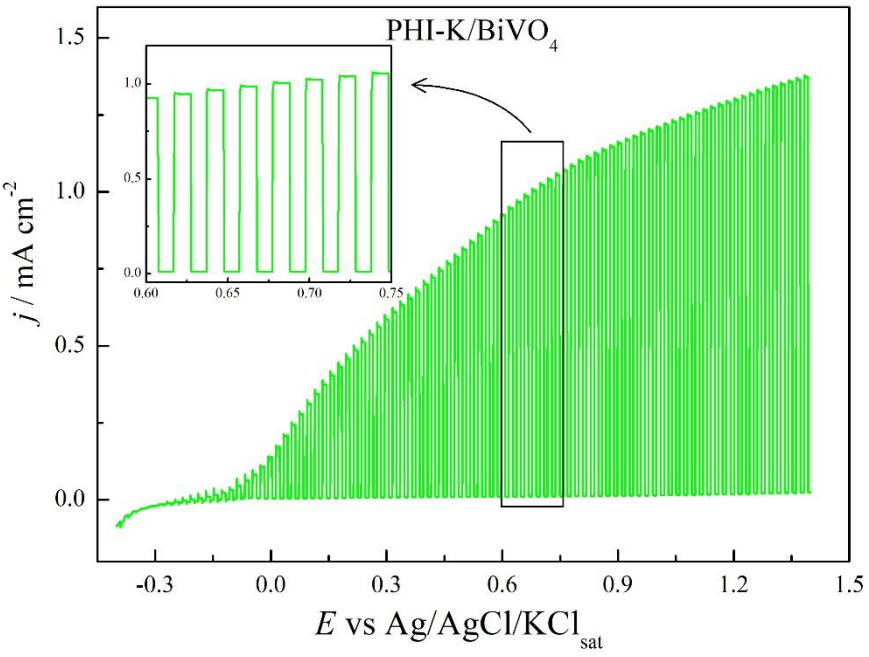

Figure S11: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for the PHI-K/$BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

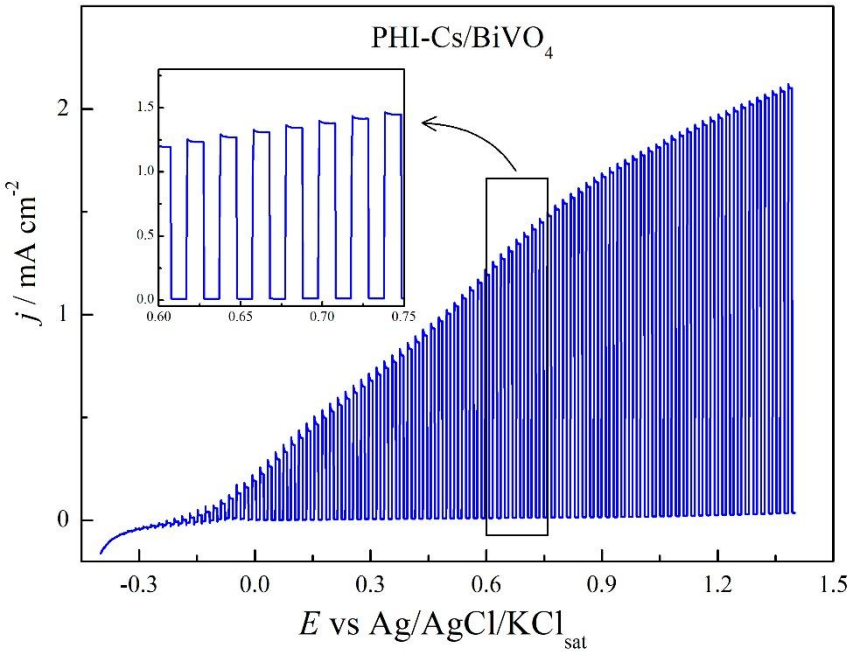

Figure S12: LSV at 0.05 $V \cdot s^{-1}$ on chopped illumination for the PHI-Cs/$BiVO_4$ film. Solution condition: Na_2SO_4 (0.5 $mol \cdot L^{-1}$, pH 6.8) + glycerol (1.0 $mol \cdot L^{-1}$).

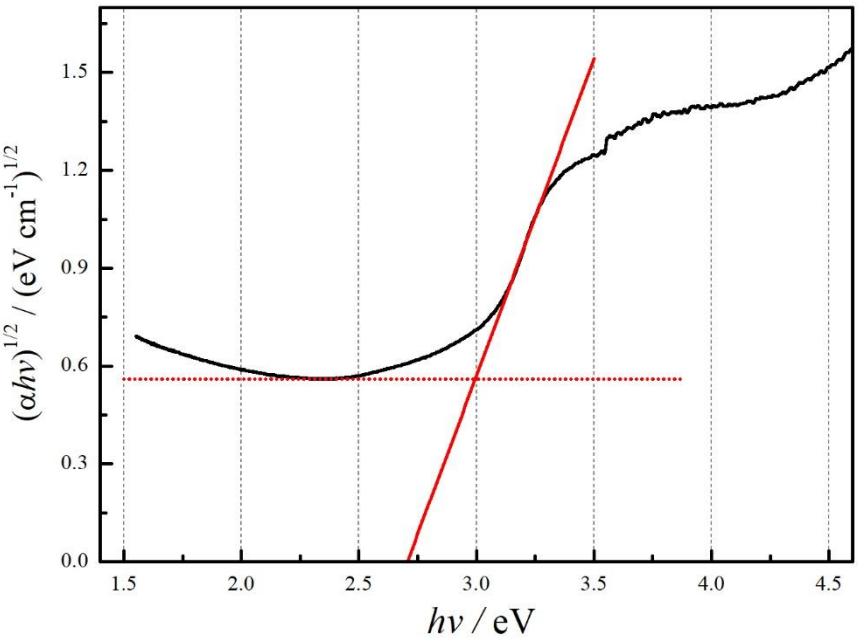

Figure S13: Tauc plot from UV–vis spectrum for PTI-Li after thermal treatment at 500 °C for 2 h.