Supporting Information

Photovoltaic-enhanced water splitting properties of low-temperature synthesis $BiVO_4$ photoanode films

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BVO-ITO photoanode films with different thicknesses were prepared by sol-gel spin coating method. The phase, element composition and oxygen evolution performance of the materials were analyzed. BVO photoanodes with a thickness of 90, 120, 150, 180 and 210 nm are represented by BVO-*x* (*x*=90, 120, 150, 180, 210), respectively.

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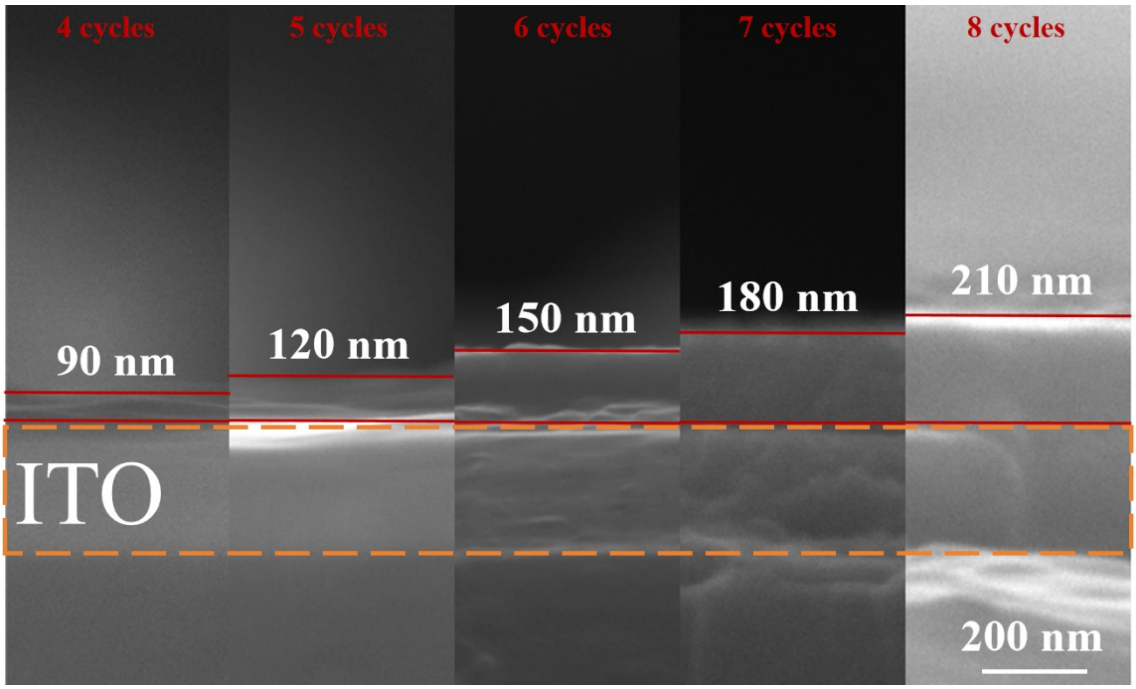

Fig. **S1** Out-of-plane SEM image of BVO photoanodes with spin coating 4~8 cycles.

Fig. **S2** Plot of $[ahv]^2$ as a function of hv of BVO-x (x=90, 120, 150, 180, 210) photoanodes.

Fig. **S3** Fine scanning XPS O 1s spectra of (a) BVO-90, (b) BVO-150, (c) BVO-180, (d) BVO-210 photoanodes.

Fig. **S4** (a) *J-V* curves and (b) *J-t* curves (1.23 V vs RHE) of BVO-x (x=90, 120, 150, 180, 210) photoanodes under repeated AM-1.5G light on and off switching.

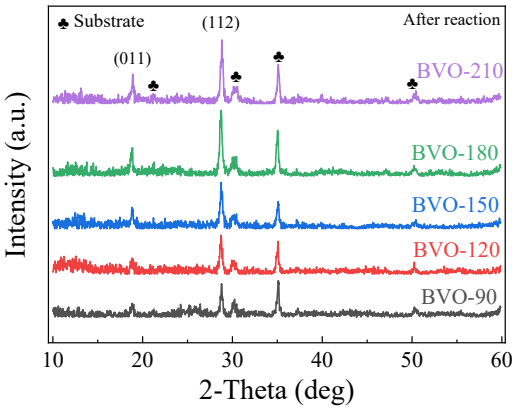

Fig. **S5** XRD patterns of BVO-*x* (*x*=90, 120, 150, 180, 210) photoanodes after oxygen evolution reaction.

Fig. **S6** Mott-Schottky plots of BVO-*x* (*x*=90, 120, 150, 180, 210) photoanodes.

Fig. **S7** *J*-*V* curves of (a) BVO-90, (b) BVO-150, (c) BVO-180, (d) BVO-210 under dark and lights illumination (measured in two-electrode system).

Fig. **S8** *J*-*t* curves of BVO-*x* (*x*=90, 120, 150, 180, 210) photoanodes under repeated (a) 365 nm, (b) 450 nm, (c) 520 nm light on and off switching (zero bias).