Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Template-engineered epitaxial $BiVO_4$ photoanodes for efficient solar water splitting

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Supporting figures

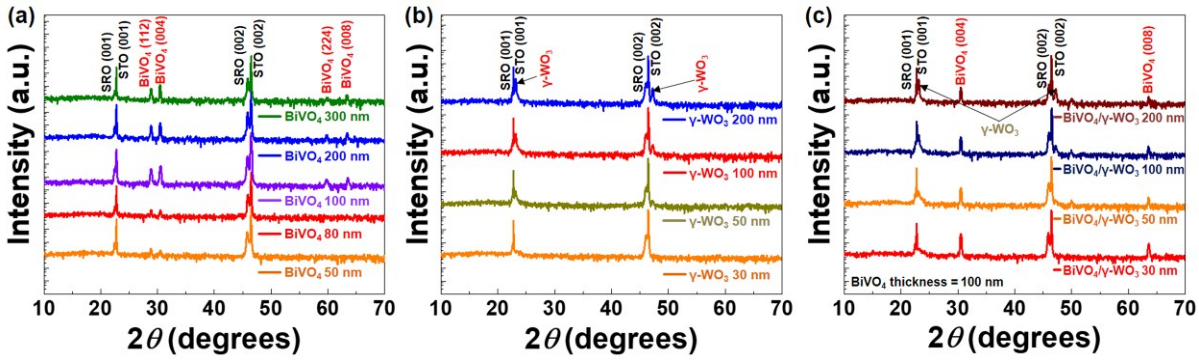

Figure S1. Out-of-plane θ-2θ XRD patterns for (a) bare $BiVO_4$ with various thicknesses, (b) bare γ-WO_3 with various thicknesses, (c) epitaxial $BiVO_4$ on the γ-WO_3 template layer of various thicknesses grown on the SRO-buffered STO (001) substrate.

Supporting figures

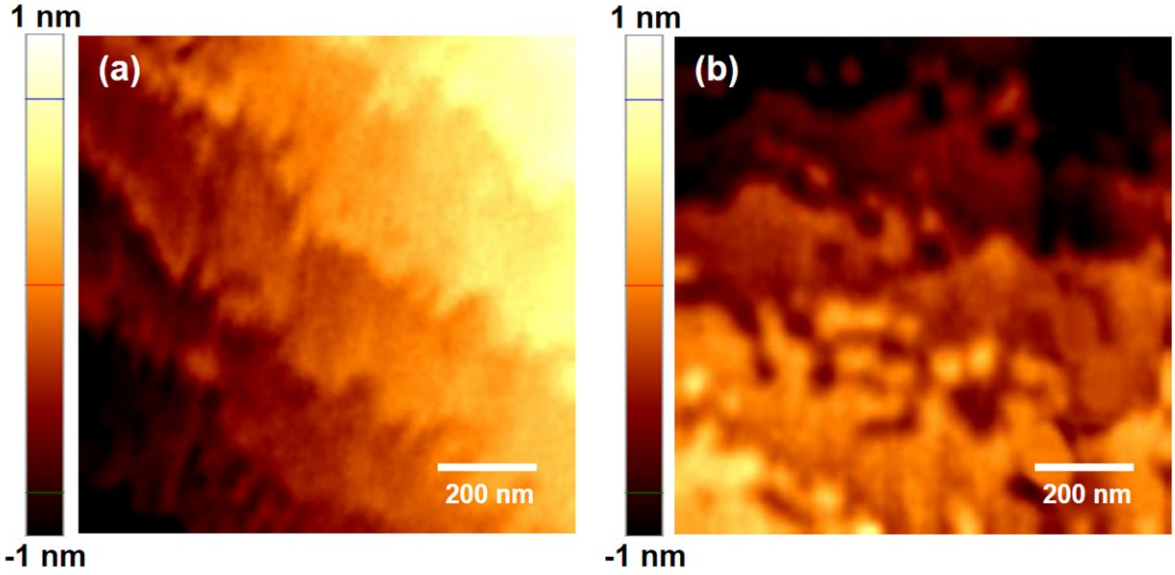

Figure S2. AFM surface morphology image of (a) STO (001) substrate, (b) 50-nm-thick SRO on STO (001) substrate.

Supporting figures

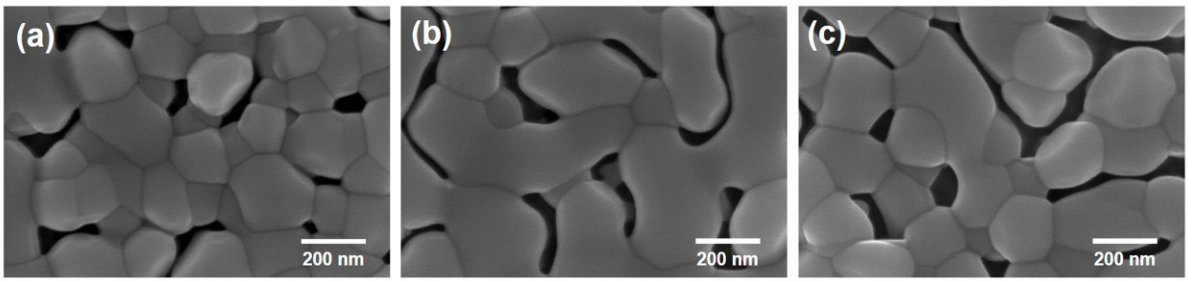

Figure S3. Top-view SEM images of epitaxial $BiVO_4$ on the (a) 30-nm, (b) 100-nm, (c) 200-nm-thick γ-WO_3 template layer grown on the SRO-buffered STO (001) substrate.

Supporting figures

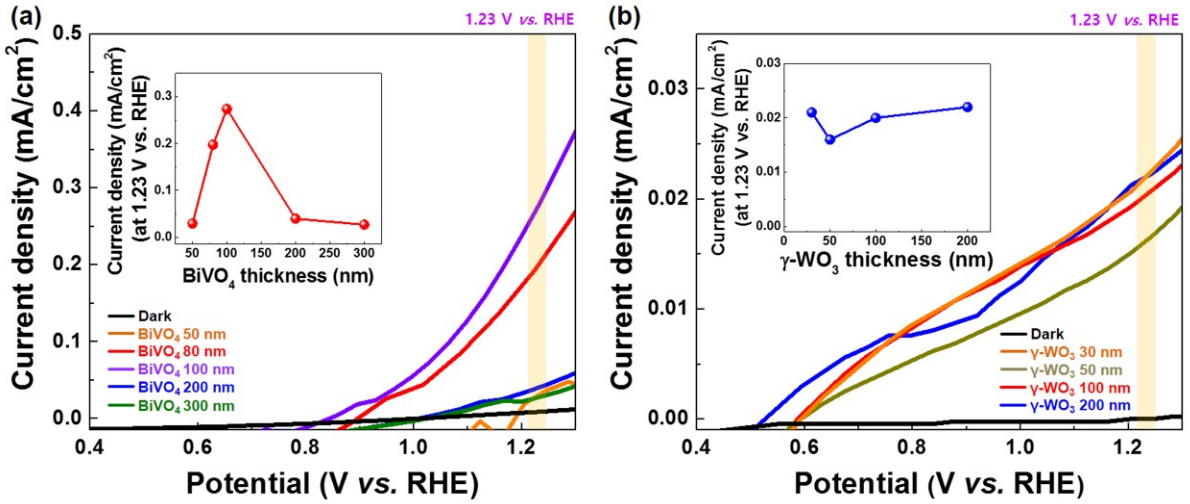

Figure S4. Linear sweep voltammetry curves (LSVs) of (a) bare $BiVO_4$ with various thicknesses, (b) bare γ-WO_3 with various thicknesses under the illumination of a solar simulator (AM 1.5G, 100 mW cm^{-2}) in 0.5 M Na_2SO_4 with 0.5 M Na_2SO_3 aqueous solution. Insets show the plot of photocurrent density at 1.23 V *vs.* RHE of bare $BiVO_4$ and bare γ-WO_3 with various thicknesses.

Supporting figures

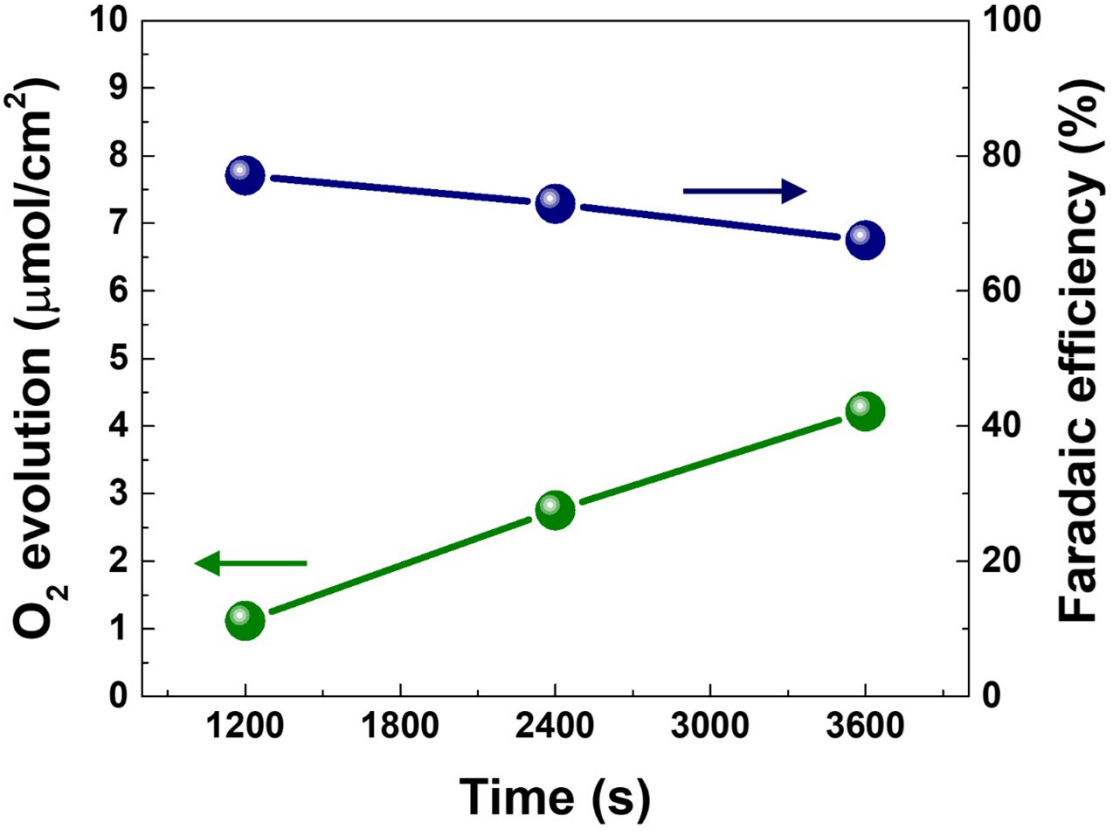

Figure S5. O_2 evolution (left *y*-axis) and faradaic efficiency (right *y*-axis) of 100-nm-thick $BiVO_4$ on the 30-nm-thick γ-WO_3 template on the SRO-buffered STO (001) substrate measured at 1.23 V *vs.* RHE in 0.1 M Na_2SO_4 electrolyte under simulated AM 1.5G illumination.

Table S1. Photocurrent densities of polycrystalline $BiVO_4$-based heterojunction photoelectrodes for PEC water splitting reported recently. (PADD: polymer-assisted direct deposition, GLAD: glancing angle deposition, ED: electrodeposition)

Year	Photoelectrode	Electrolyte	Performance	Method	Ref.
2015	Co-Ci/$BiVO_4$/WO_3	0.1 M $KHCO_3$	~3.50 mA cm^{-2} at 1.23 V *vs.* RHE	PADD	S1
2016	$BiVO_4$/WO_3/SnO_2	0.5 M Na_2SO_4 in a 0.1 M NaPi with 0.2 M H_2O_2 as hole scavenger	~2.50 mA cm^{-2} at 1.23 V *vs.* RHE	PLD	S2
2016	Sb:SnO_2/$BiVO_4$ core/shell	Phosphate buffer with 1 M Na_2SO_3	~7.97 mA cm^{-2} at 1.23 V *vs.* RHE	hydrothermal reaction + drop-casting	S3
2016	$BiVO_4$/WO_3	0.5 M KPi + 1 M Na_2SO_3	~4.55 mA cm^{-2} at 1.23 V *vs.* RHE	GLAD + Pulsed ED	S4

References

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