Supporting information (SI)

Low-dimensional Mo:$BiVO_4$ photoanodes for enhanced photoelectrochemical activity

Miaoyan Huang,[a,b] *Juncao Bian,*[a,b,c] *Wei Xiong,*[a,b] *Chao Huang,*[a,b] *and Ruiqin Zhang*[*a,b]

[a]Department of Physics, City University of Hong Kong, Hong Kong SAR, China

[b]Shenzhen Research Institute, City University of Hong Kong, Shenzhen, China

[c]Department of Electrical Engineering, The Hong Kong Polytechnic University, Hong Kong SAR, China

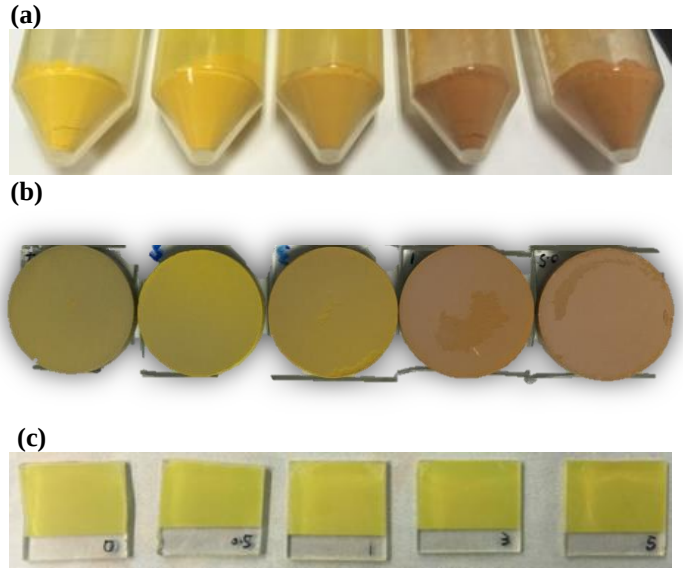

Figure S1. Digital photo of as prepared $BiVO_4$. (a) Powder, (b) targets and (c) films

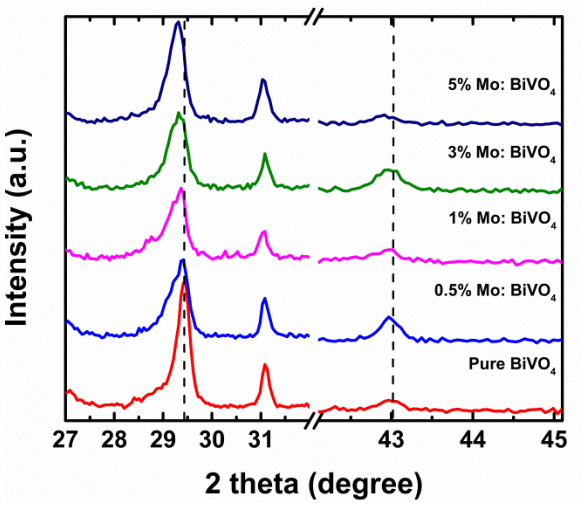

Figure S2. Magnifications of XRD patterns.

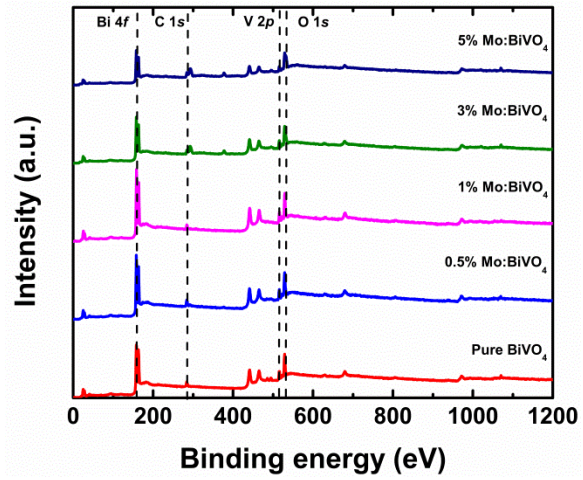

Figure S3. XPS survey scan for $BiVO_4$ films.

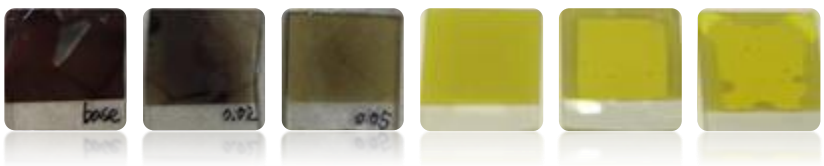

Figure S4. Films prepared under base vacuum, 0.02mbar, 0.05mbar, 0.2mbar, 0.5mbar, 1mbar. (From left to right)

Table S1. Surface and bulk composition of pure $BiVO_4$ and Mo:$BiVO_4$ films

Photoanode	V at%, Mo at% and Bi at% (XPS)	V at%, Mo at% and Bi at% (EDS)
Pure $BiVO_4$ film	33.82%, N/A and 66.18%	43.04%, N/A and 56.96%
1% Mo:$BiVO_4$ film	33.62%, 1% and 65.38%	43.50%, 0.73% and 55.77%
5% Mo:$BiVO_4$ film	31.71%, 3.17% and 65.12%	41.15%, 2.51% and 56.34%

Table S2. Summary of Mo:$BiVO_4$ films flat band potential and carrier density

Photoanode	Flat band potential (V) vs. RHE	Carrier density/cm^3
Pure $BiVO_4$	0.011	6.42×10^{18}
0.5% Mo:$BiVO_4$	0.023	1.24×10^{19}
1% Mo:$BiVO_4$	0.025	2.06×10^{19}
3% Mo:$BiVO_4$	0.041	3.42×10^{19}
5% Mo:$BiVO_4$	0.042	5.11×10^{19}

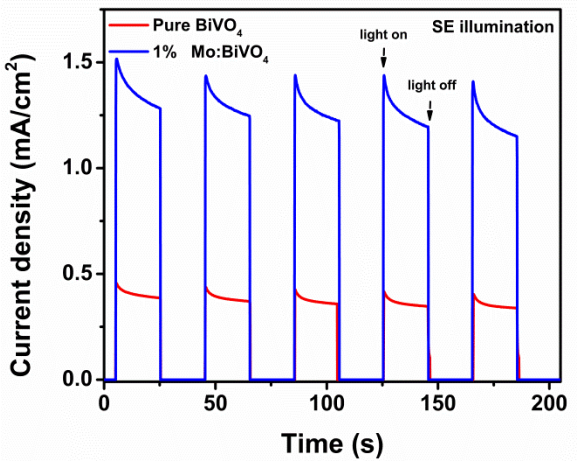

Figure S5. Chopped transient photocurrent density of pure $BiVO_4$ and 1% Mo:BiVO4 films for water oxidation under SE illumination

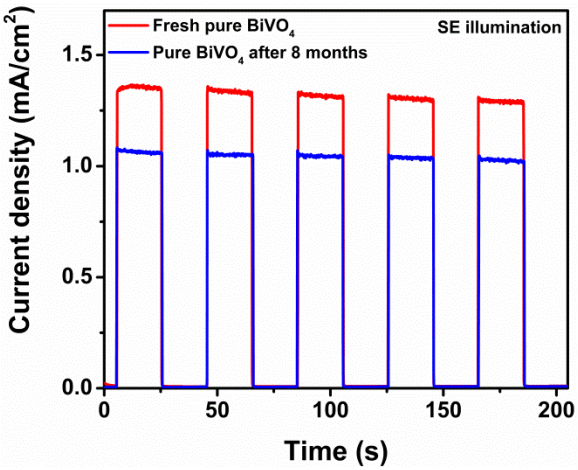

Figure S6. chopped transient photocurrent density of fresh photoanode and photoanode that has been kept in the dark for 8 months respectively.

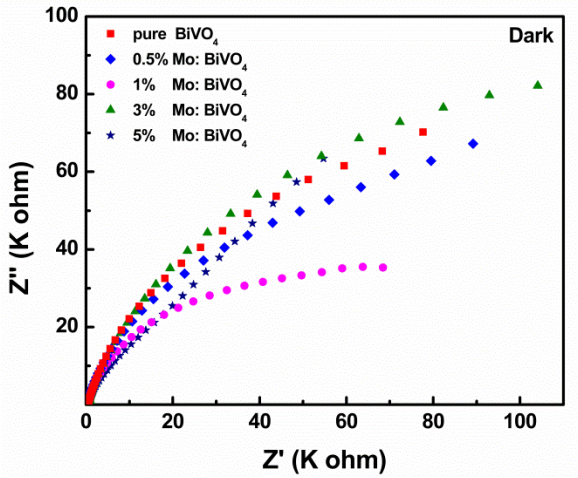

Figure S7. Nyquist plots of $BiVO_4$ films in dark conditions.

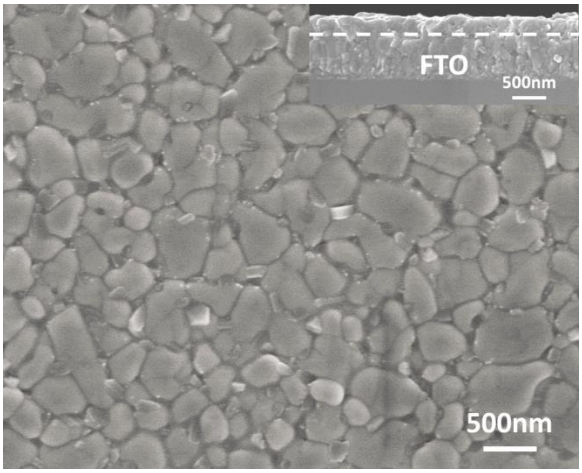

Figure S8. Plane-view and cross-sectional (inset) field emission scanning electron microscopy images of pure $BiVO_4$ film prepared under base vacuum.