## Enhancing Photoelectrochemical Performance by Effectively Managing the Density of Oxygen Vacancies in CuO/BiVO<sub>4</sub> Composites

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Table S1. Lattice parameters of various BiVO<sub>4</sub> samples before and after hydrogenation.

Sample	a (nm)	b (nm)	c (nm)
BV	0.50	0.50	1.14
BV300	0.50	0.50	1.15
BV350	0.52	0.51	1.16
BV400	0.52	0.52	1.18

Table S2. Correlation between the oxygen vacancy concentration, quantified as the (oxygen vacancy)/(lattice oxygen) ratio from XPS O 1s spectra, and the charge carrier density (Nd) derived from Mott-Schottky analysis.

sample	oxygen vacancy region lattice oxygen region %	N <sub>D</sub> (cm <sup>-3</sup> ) Charge carrier density
BV	0.41	3.48×10 <sup>19</sup>
BV300	0.52	9.62×10 <sup>19</sup>
BV350	0.76	$1.43 \times 10^{20}$
BV400	1.27	$1.68 \times 10^{20}$



Figure S1. Long-term stability test of the photocurrent density for the BV400C photoanode under 10 hours of continuous illumination at 0.5 V vs. Ag/AgCl in 0.5 M  $Na_2SO_4$  electrolyte.