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Electronic Supplemental Information

Fig. S1 LSV curves of BiFeO₃, P-BiFeO₃ photoanodes measured in 0.2 M Na₂SO₄ electrolyte solution with the addition of 0.1 M Na₂SO₃

Fig. S2 LSV curves of $BiFeO_3$, P- $BiFeO_3$ photoanodes measured in 0.2 M Na_2SO_4 electrolyte solution with the addition of 0.1 M Na_2SO_3 under 90 kHz ultrasonic vibration

Fig. S3 Hydrogen evolution curve measured under AM 1.5G continuous illumination Fig. S4 EDS elemental mapping diagram of P-BiFeO₃

Fig. S5 CV of BiFeO₃ (a) and P-BiFeO₃(b) photoanodes performed at different scan rates; Charging current density differences of BiFeO₃ and P-BiFeO₃ (c) photoanodes plotted against scan rates

Tab. S1 The flat band potential (V_{FB}) and carrier density (N_d) of BiFeO₃ and P-BiFeO₃ photoanodes with different conditions

Tab. S2 The fitted parameters extracted from Nyquist plots of BiFeO₃ and P-BiFeO₃ photoanodes with different conditions



Fig. S1 LSV curves of BiFeO₃, P-BiFeO₃ photoanodes measured in 0.2 M Na₂SO₄ electrolyte solution with the addition of 0.1 M Na₂SO₃



Fig. S2 LSV curves of BiFeO₃, P-BiFeO₃ photoanodes measured in 0.2 M Na₂SO₄ electrolyte solution with the addition of 0.1 M Na₂SO₃ under 90 kHz ultrasonic vibration



Fig. S3 Hydrogen evolution curve measured under AM 1.5G continuous illumination



Fig. S4 EDS elemental mapping diagram of P-BiFeO3



Fig. S5 CV of BiFeO₃ (a) and P-BiFeO₃(b) photoanodes performed at different scan rates; Charging current density differences of BiFeO₃ and P-BiFeO₃ (c) photoanodes plotted against scan rates

Tab. S1 The flat band potential (V_{FB}) and carrier density (N_d) of BiFeO₃ and P-BiFeO₃ photoanodes with different conditions

Samples	V _{FB} (V vs RHE)	N_d (cm ⁻³)	
BiFeO ₃	0.57	3.5×10 ¹³	
P-BiFeO ₃	0.55	4.2×10 ¹³	
BiFeO ₃ under 90 kHz	0.47	2.7×10^{14}	
ultrasonic vibration	0.47	5.7~10	
P-BiFeO ₃ under 90 kHz	0.42	1.9×10 ¹⁵	
ultrasonic vibration	0.43		

Samples	$R_1 (\Omega \ cm^2)$	$R_2 (\Omega \ cm^2)$	$W_1(\Omega \ cm^2)$	CPE(F/cm ²)
BiFeO ₃	30.24	2275	0.36970	0.89574
P-BiFeO ₃	28.26	2232	0.59625	0.87823
BiFeO ₃ under 90 kHz	17 76	478	0.33245	0.81254
ultrasonic vibration	17.70			
P-BiFeO ₃ under 90 kHz	14.12	402	0 21251	0 80225
ultrasonic vibration	14.12	402	0.21331	0.07323

Tab. S2 The fitted parameters extracted from Nyquist plots of BiFeO₃ and P-BiFeO₃ photoanodes with different conditions