Electronic Supplementary Information

Ultrathin TiO_2 Interfacial Layer Enhancing the Performance of $FeVO_4$ Photoanode for Water Splitting

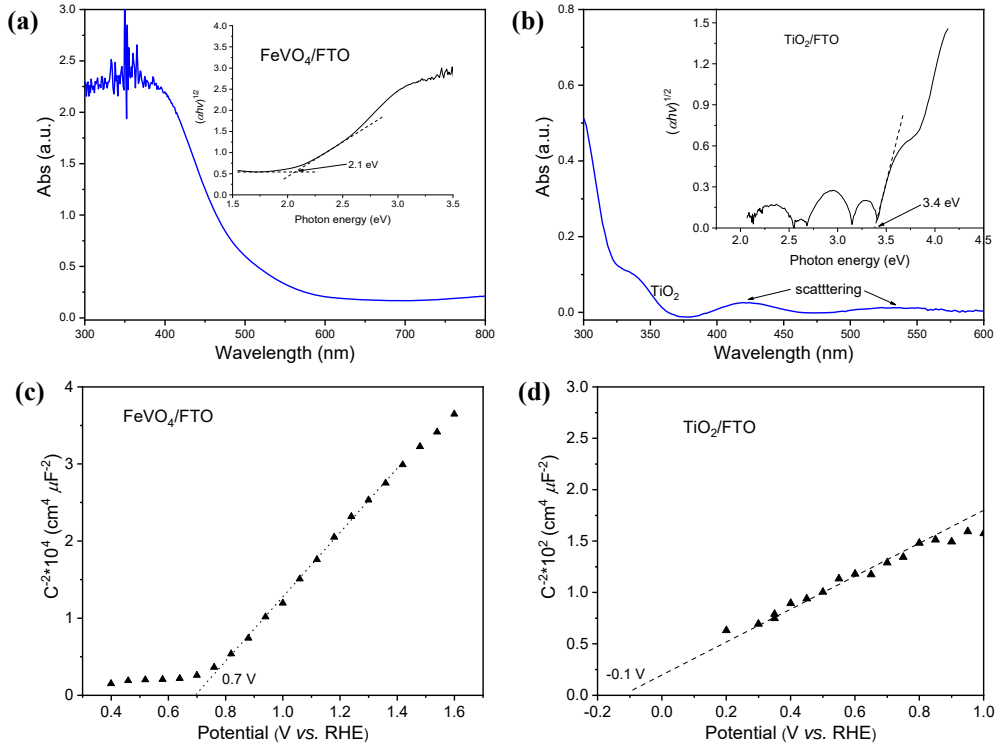

Fig. S1 (a-b) UV-Vis absorption spectra for the samples, the insets showed the plots of $(ahv)^{1/2}$ versus the photon energy, and the bandgap energies of $FeVO_4$ and TiO_2 were estimated to be 2.1 and 3.4 eV, respectively. (c-d) Mott-Schottky plots for the samples, the flat-band potentials of $FeVO_4$ and TiO_2 were determined to be 0.7 and -0.1 VRHE, respectively.

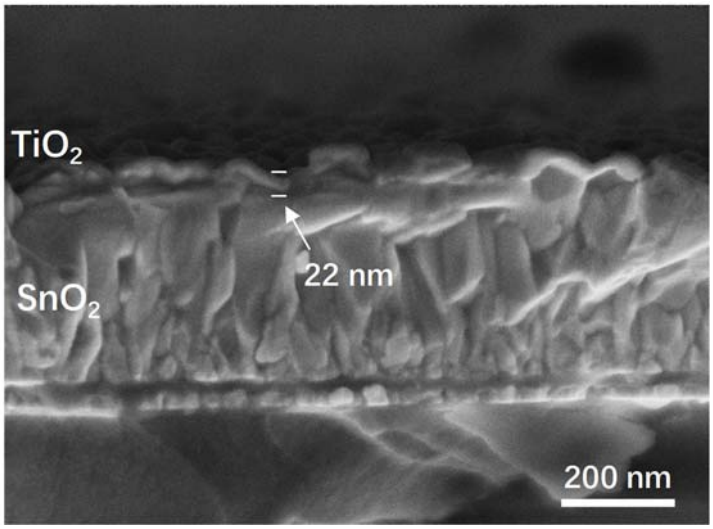

Fig. S2 Cross-sectional SEM image of FTO with a 300-cycle TiO_2 deposition layer

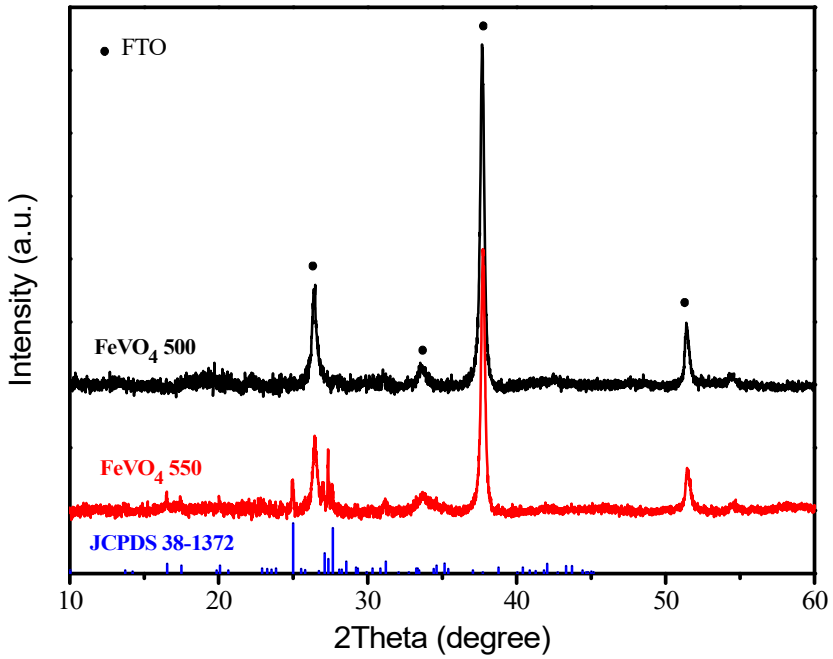

Fig. S3 XRD patterns of $FeVO_4$ photoanodes annealed at 500 °C and 550 °C

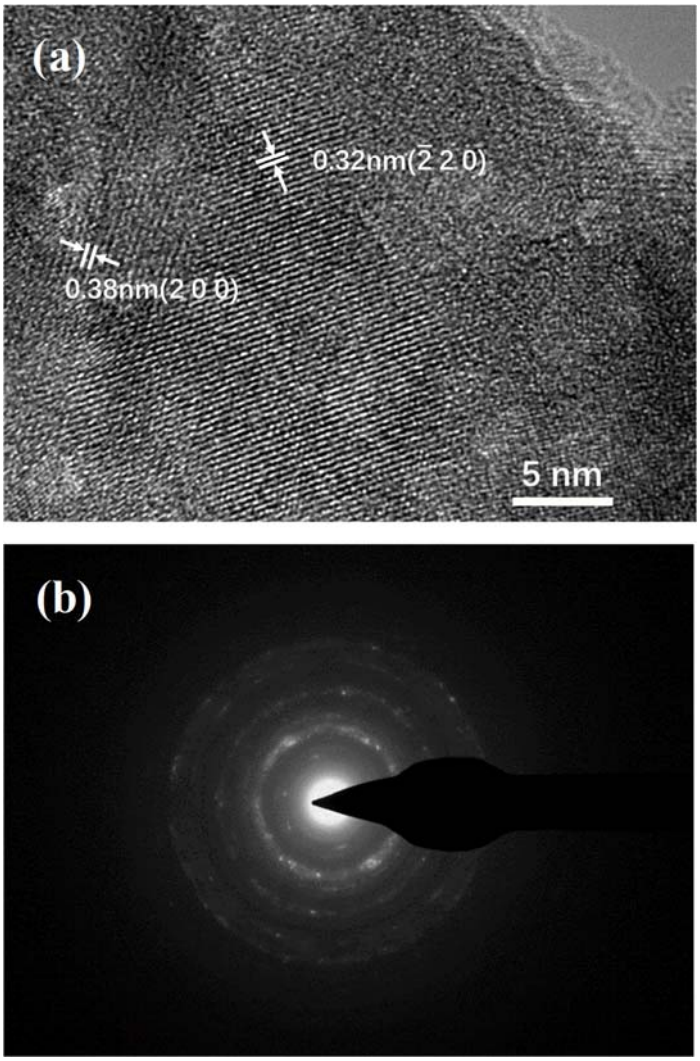

Fig. S4 (a) HRTEM and (b) Electron diffraction patterns of $FeVO_4$ scratched from $FeVO_4/TiO_2/FTO$

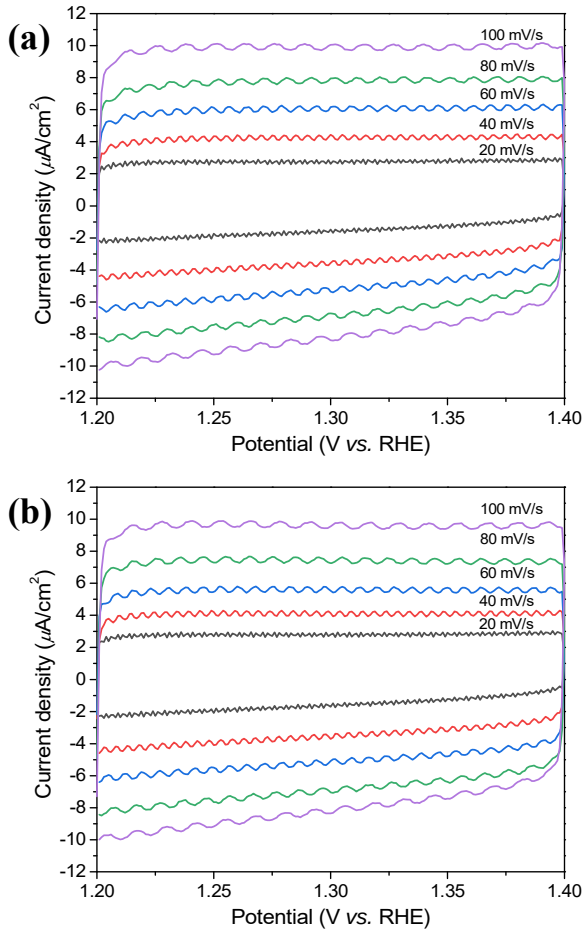

Fig. S5 Cyclic voltammetry curves of (a) $FeVO_4$ and (b) $FeVO_4/TiO_2$/FTO electrodes under dark.

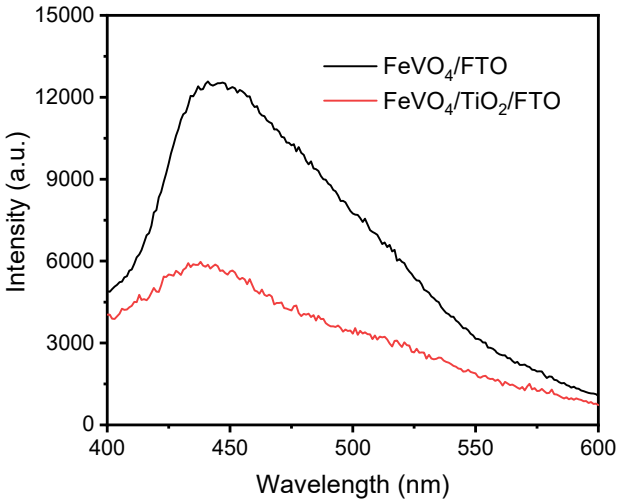

Fig. S6 The photocurrent density at 1.6 V_{RHE} for $FeVO_4/TiO_2$/FTO electrode with different thickness of TiO_2 underlayers

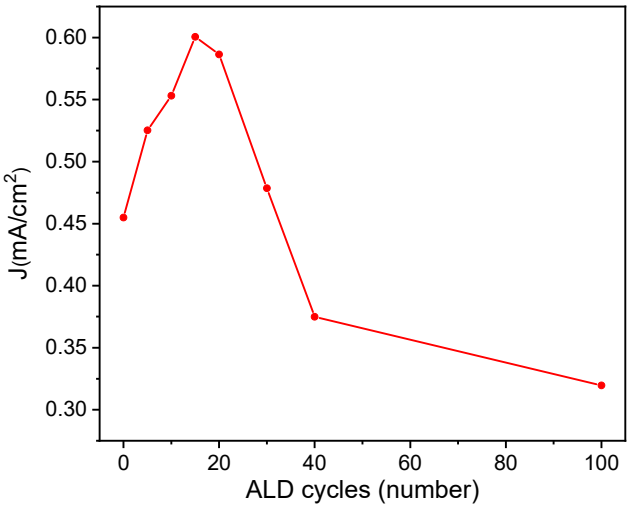

Fig. S7 The photoluminescence spectra for the electrodes, with the excitation wavelength at 350 nm.

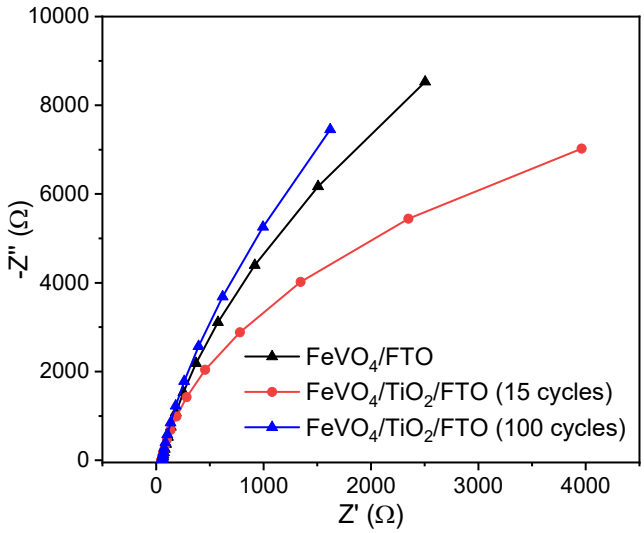

Fig. S8 Nyquist plots of the electrodes.

Table S1 The resistance values estimated by fitting the EIS data for the electrodes

Sample	**R_S(Ω)**	**R_B(kΩ)**	**R_I(kΩ)**
$FeVO_4$/FTO	54.3±0.2	3.23±0.04	60.9±0.1
$FeVO_4$/TiO_2/FTO (15 cycles)	54.0±0.2	2.27±0.05	21.4±0.1
$FeVO_4$/TiO_2/FTO (100 cycles)	54.6±0.2	8.26±0.09	80.3±0.4

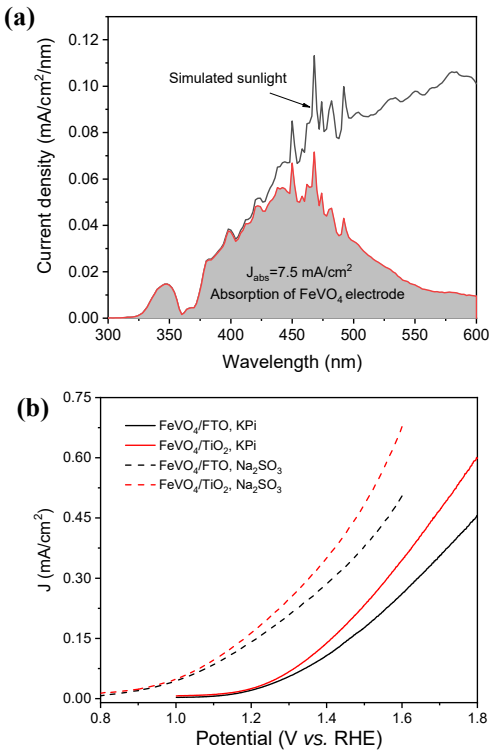

Fig. S9 The theoretical photocurrent spectrum for $FeVO_4$ electrode obtained by multiplication of its light absorbance spectrum with photoflux spectrum of the simulated sunlight, with the theoretical photocurrent density of 7.5 mA/cm^2, (b) the photocurrent density-applied potential curves of the photoelectrodes in potassium phosphate (KPi) buffer solution or Na_2SO_3 solution.

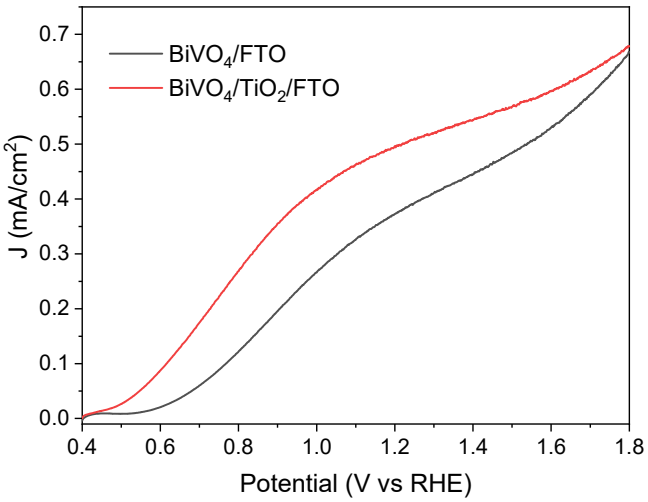

Fig. S10 The photocurrent density-applied potential curves over the photoelectrodes for PEC water oxidation reaction