Supporting information for the manuscript

Mesoporous Thin Film WO_3 Photoanode for Photoelectrochemical Water Splitting: A Sol-Gel Dip Coating Approach

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WO_3 film type	$\phi\Sigma\mu$ ($10^{-3}cm^2/(V\cdot s)$) at $5.9x10^{12}$ photons/cm^2/pulse	$\phi\Sigma\mu$ ($10^{-3}cm^2/(V\cdot s)$) at 10^9 photons/cm^2/pulse (extrapolated)	τ (ns)		L_D (nm)	
			τ_1	τ_2	L_{D1}	L_{D2}
Dense ≈ 300 nm	7.8	9	91	455	46	103
mesoporous ≈ 550 nm	12.2	15	72	428	53	129

Table S.1 TRMC results for dense and mesoporous WO_3 on quartz

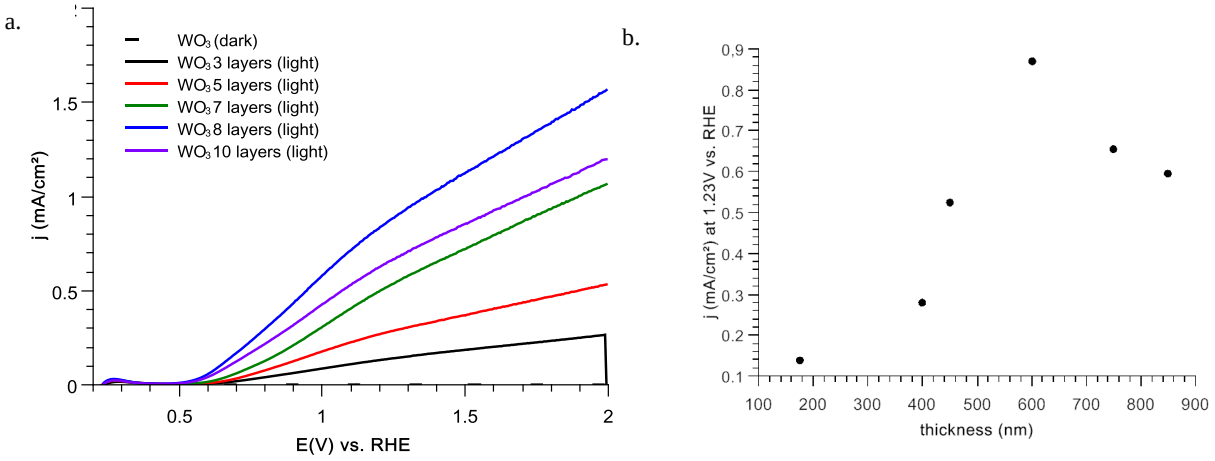

Figure S1. a. Impact of thickness on *J-V* curves, b. J (mA/cm^2) at 1.23 V vs. RHE as function of the thickness.

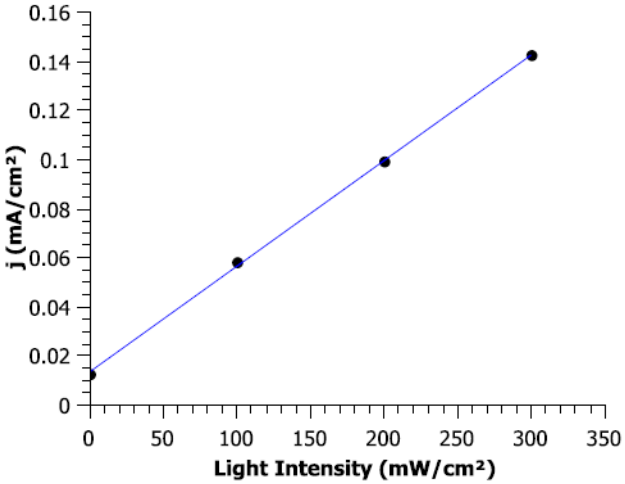

Fig. S2. Photoresponse of WO_3 at 1.23V vs. RHE as a function of light intensity in 1 M potassium phosphate buffer (pH 6)

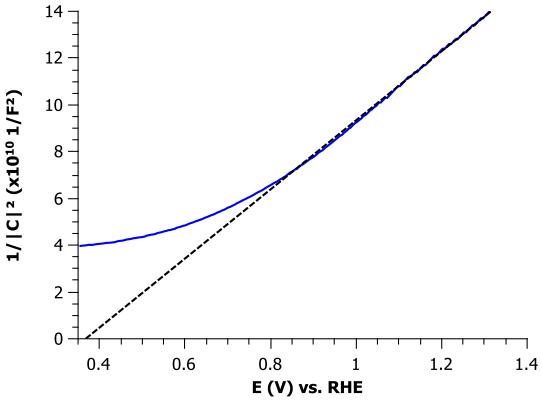

Fig. S3. Mott Schottky plot of mesoporous WO_3 (blue) at 1000 Hz in 1 M potassium phosphate buffer (pH 6) with linear fit (dotted line)

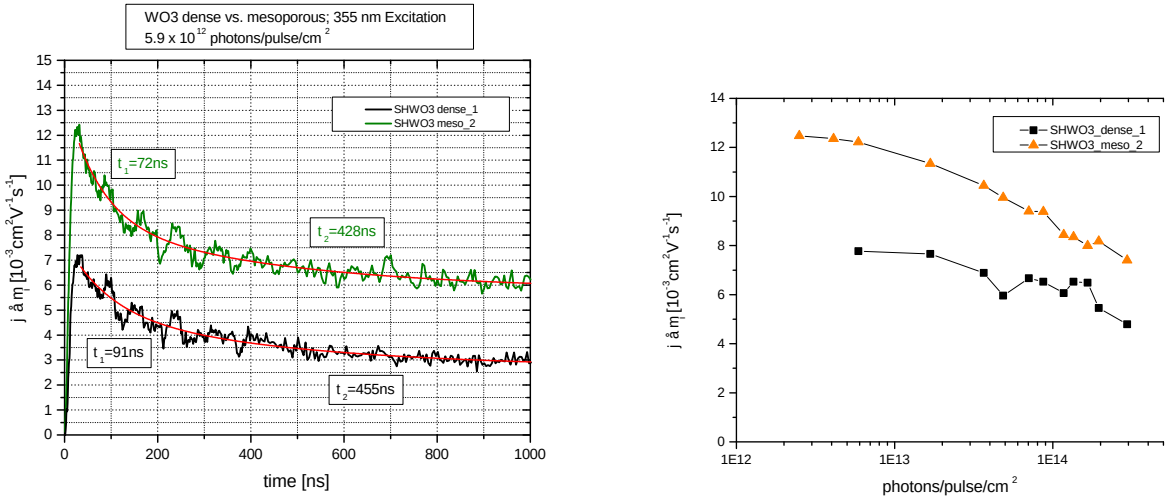

Fig. S4. TRMC lifetime decay signals from charge carrier mobility (left) and as a function of photons/pulse/cm² (right)

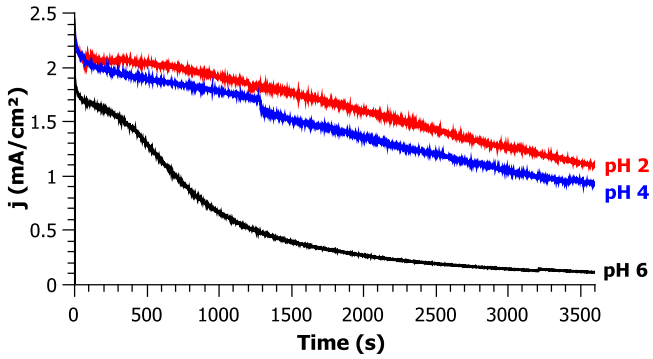

Fig. S5 Current density profile of WO_3 at 1.5 V vs. RHE in 1 M potassium phosphate under 350 mW/cm² illumination in pH 2 (red), pH 4 (blue), and pH 6 (black)

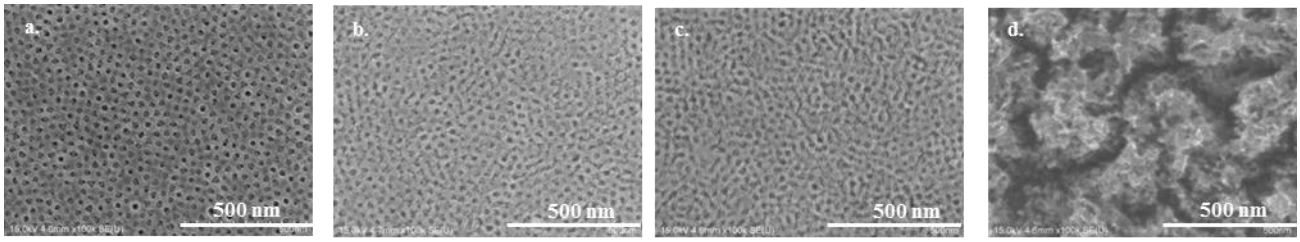

Fig. S6. SEM images of (a) WO_3 before use and after 1 hour irradiated at 350 mW/cm² in 1 M potassium phosphate buffer (b) pH 2, (c) pH 4, and (d) pH 6

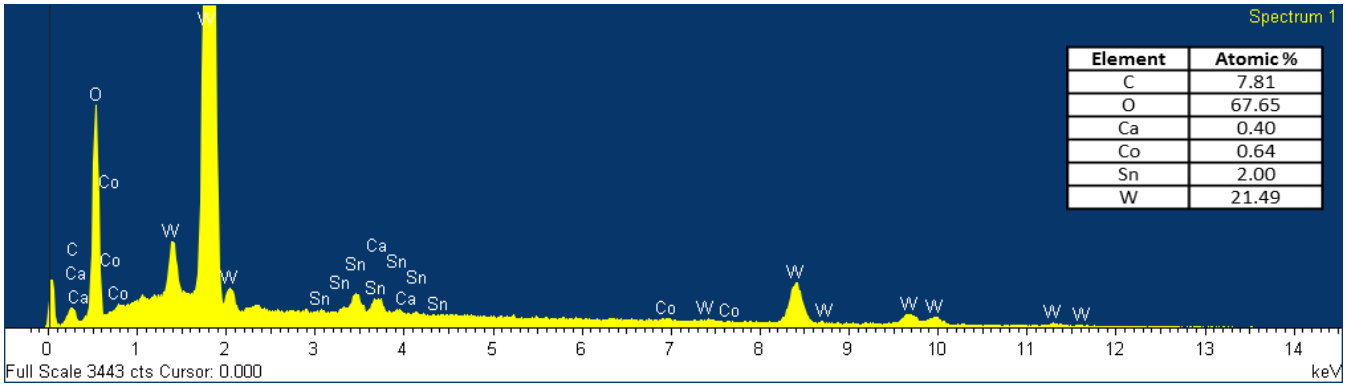

Fig. S7. EDX spectra of 5 minute deposition of Co-Pi co-catalyst onto mesoporous WO_3. Table shows the quantification of cobalt compared to tungsten