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SUPPLEMENTARY INFORMATION

Highly Efficient Mobility, Separation and Charge Transfer in Black SnO_2-TiO_2 structures with co-catalysts: The key step for the photocatalytic hydrogen evolution

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Characterization

XPS characterization was performed a K-Alpha from a Thermo Fisher Scientific X-ray photoelectron spectrometer with a monochromatic Al Kα X-ray source (1486.6 eV) and a base pressure of 1×10^{-9} Torr in the analytical chamber. Survey scan was acquired using pass energy of 160 eV while high-resolution spectra were acquired to 40 eV.

The (photo)electrochemical measurements were performed in a conventional three-electrode cell using a reference electrode of Ag/AgCl (Sat), graphite rod (99.9995% purity, Alfa Aesar) as a counter electrode, and films of the as-synthesized materials deposited in 1 cm^2 of a surface of fluorine-doped tin oxide (FTO) as working electrode. A solution of 0.05 M $KClO_4$ in a ratio of 1:1 of methanol: water was used. The semiconducting properties were determined in an AUTOLAB 302 N potentiostat, obtaining the plots C_{sc}^{-2} versus potential using a perturbation of ±10 mV and frequency of 400 Hz. The mobility, separation and charge transfer of the synthesized materials were determined through open circuit potential (OCP) and chronoamperometry (CA) measurements in 3 cycles with and without lighting.