

Supplementary information

Because the resistance of WO_3 films was too high to carry out Hall-effect measurements for identifying the type of charge carriers, Mott-Schottky curves were instead measured with the WO_3 films deposited on the glass substrates, whose surface was coated with a layer of ITO as the bottom electrode.

The measured Mott-Schottky curves i.e., C^{-2} vs. V (where C is the capacitance of space charge layer and V is the applied voltage), are shown in the figures below. Both films (0SiW and 6SiW) have the positive slope, indicating that they belong to the n-type semiconductors [R1].

Note: the measurements were performed by a commercial electrochemical workstation (CH Instruments, CHI6273E) with a standard three-electrode system. Pt wire and Ag/AgCl were used as the counter and reference electrodes, respectively. An aqueous solution of Na_2SO_4 (0.5M, pH=7) was used as electrolyte.

[R1] Z. Chen, et al., Flat-Band Potential Techniques, in: Z. Chen, H.N. Dinh, E. Miller (Eds.), Photoelectrochemical Water Splitting: Standards, Experimental Methods, and Protocols, Springer, New York (2013), pp. 63-85.

