

Supplementary Information

A Dye Sensitized Photosynthesis Cell for Stable Water Oxidation Mediated by Photo-Generated Bromine

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Experimental Section

Incident photon to current efficiency (IPCE) measurements

IPCE measurements were performed with the Zennium Pro electrochemical workstation (Zahner Electrochemical Co., Ltd., Kronach, Germany) and CIMPS-QE/IPCE (TLS03 tunable light source) photoelectric conversion efficiency tester.

UV-visible absorbance measurement

UV-visible absorbance measurements were performed with the CIMPS-fit spectrometer (Electrochemical, Zahner Co., Ltd., Kronach, Germany).

O₂ detection experiments

Oxygen evolution generated during the photoelectrochemical measurement was monitored using Unisense OX-NP needle microsensor located at the working electrode compartment. Before the experiment, the calibration of the oxygen microsensor was carried

out. Faradaic efficiency was determined according to the total charge passed during the photoelectrochemical measurement and the total amount of generated oxygen.

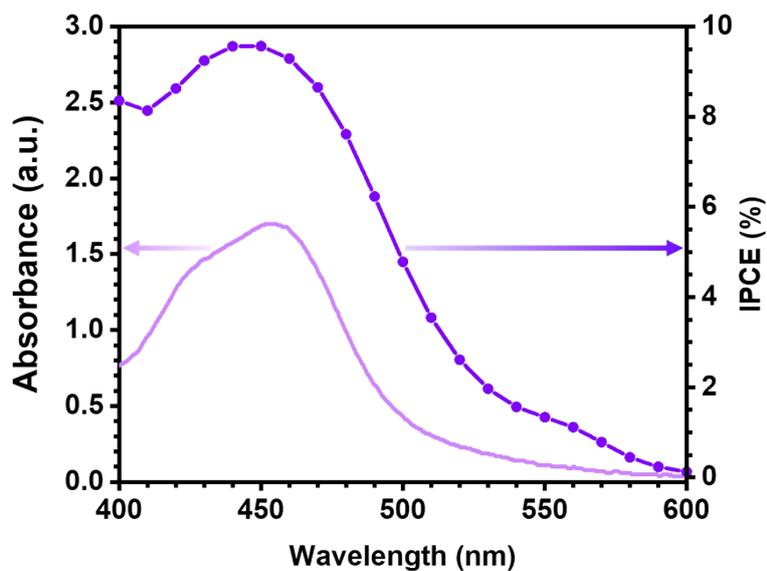


Figure S1. UV-visible absorption spectra of chromophore **RuP²⁺** (on the left axis, pale purple) and IPCE measurement for FTO|SnO₂/TiO₂-**RuP²⁺** (on the right axis, purple).

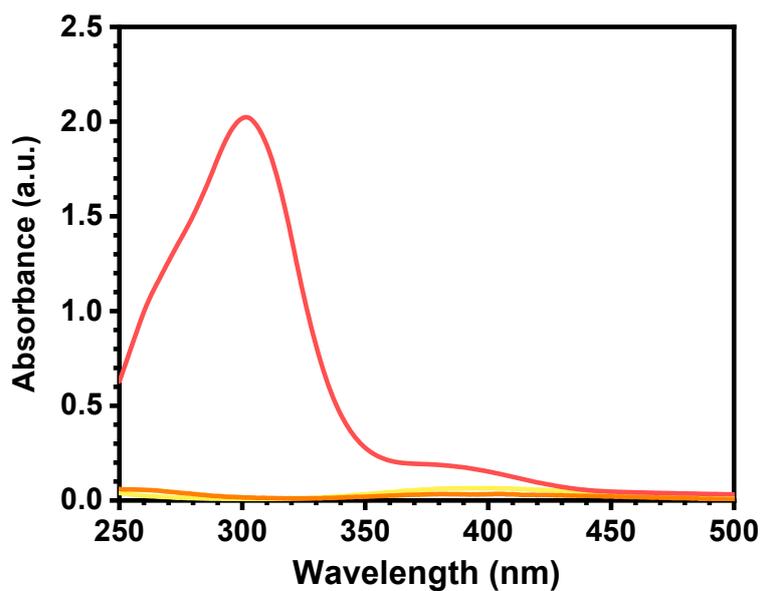


Figure S2. UV-visible absorption spectra of 0.5 mM Br₂ in 0.1 M acetate buffer at pH 4.56 (yellow), 0.5 mM Br₂ in 0.1 M HClO₄ at pH 1 (orange), and 0.5 mM Br₂ in 0.1 M HClO₄ at pH 1 with 0.025 M NaBr (red).

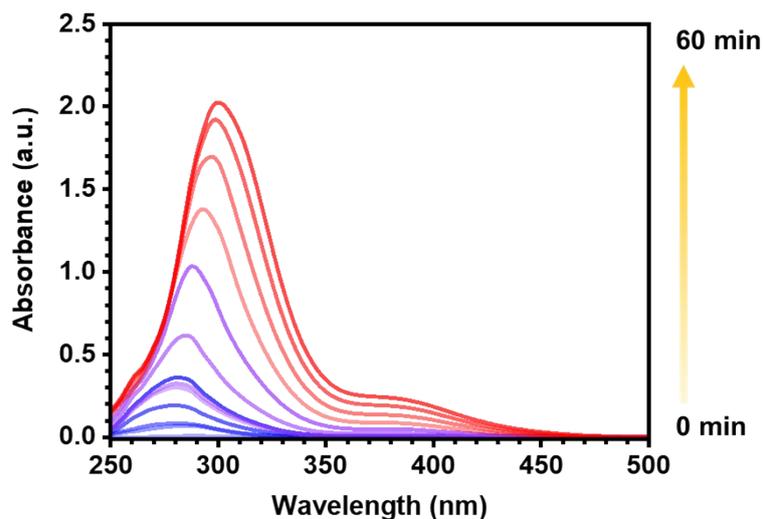


Figure S3. UV-visible absorption spectra measured of electrolyte solution during photoelectrolysis of the FTO|SnO₂/TiO₂-RuP²⁺ core/shell sensitization electrode in 0.1M acetate buffer (pH 4.56) with 0.5 M NaBr as the electron-transfer mediator.

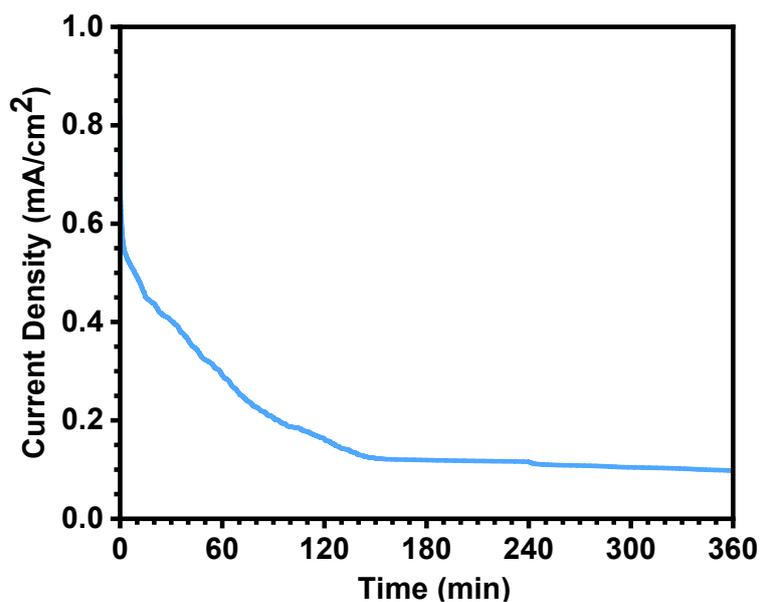


Figure S4. Photocurrent obtained for light-driven water oxidation in 0.1 M acetate buffer at pH 4.56, 0.5 M NaBr with a FTO|SnO₂/TiO₂-RuP²⁺ photoanode under 1 Sun illumination (100 mW/cm², > 420 nm filter).