Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Solar-driven Z-scheme water splitting using tantalum/nitrogen co-doped rutile titania nanorod as an oxygen evolution photocatalyst

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Electronic Supplementary Information

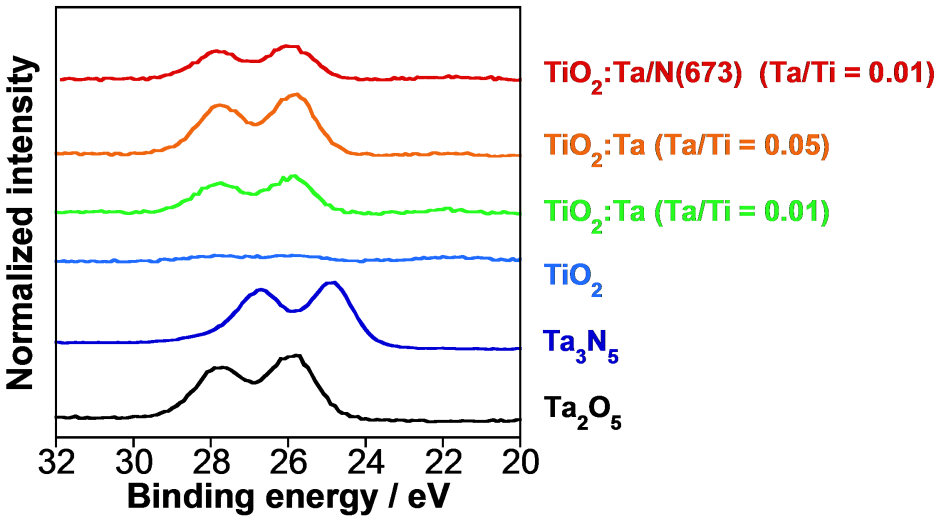

Fig. S1. Ta 4f XPS spectra of TiO_2:Ta, TiO_2:Ta/N samples, along with Ta_2O_5 and Ta_3N_5 as references.

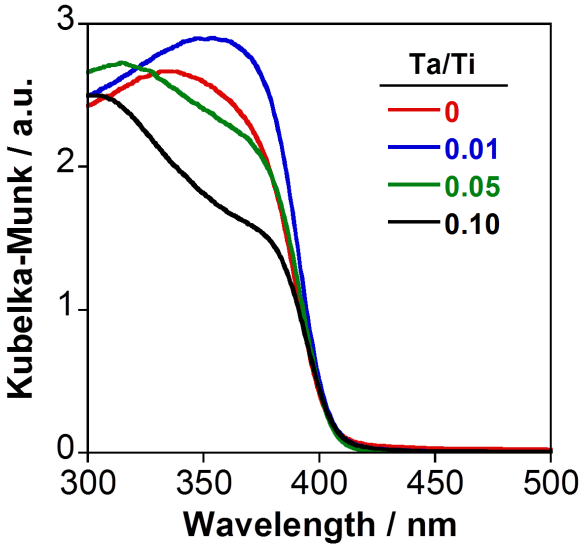

Fig. S2. DRS of TiO_2:Ta samples (Ta/Ti = 0, 0.01, 0.05 and 0.10 by mole).

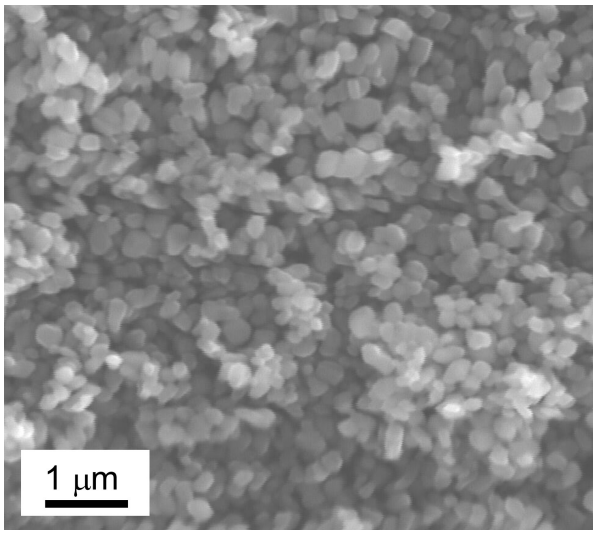

Fig. S3. SEM image of commercial TiO_2.

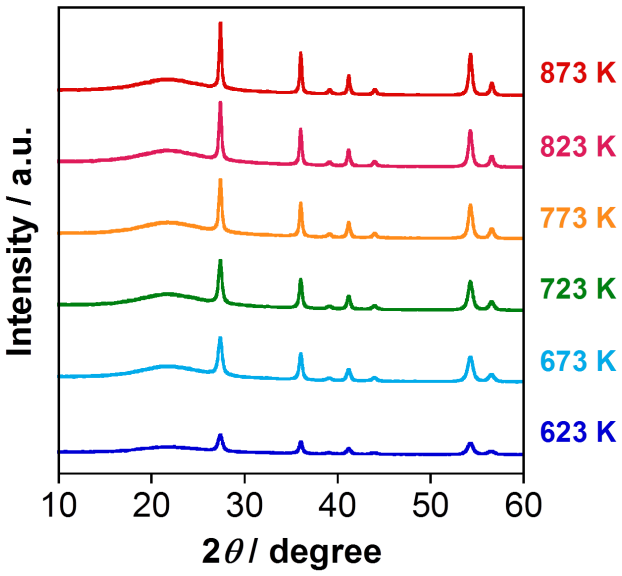

Fig. S4. XRD patterns of TiO_2:Ta/N samples at different nitridation temperatures.

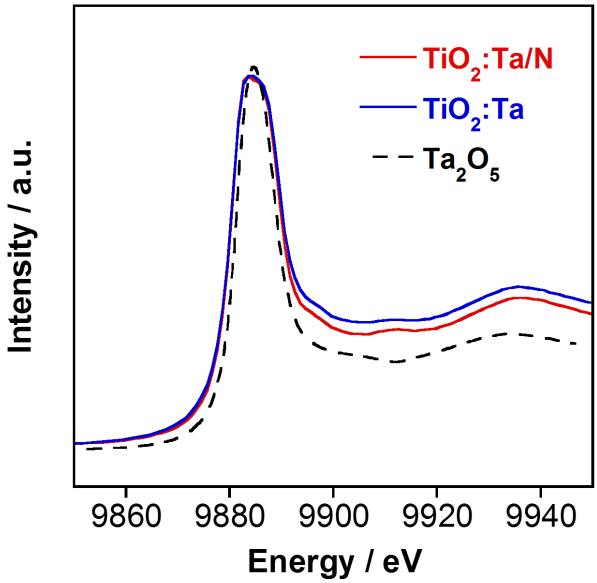

Fig. S5. Ta L_3-edge XANES spectra for TiO_2:Ta/N, TiO_2:Ta and Ta_2O_5.

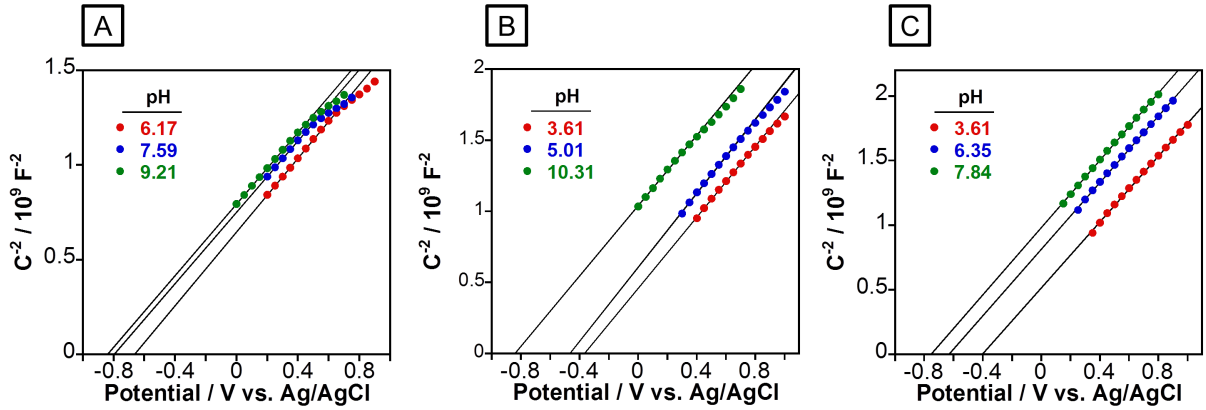

Fig. S6. Mott-Schottky plots for (A) TiO_2:Ta/N(773), (B) TiO_2:N(773) and (C) TiO_2:Ta electrodes at various pH values. Impedance frequency was 200 Hz.

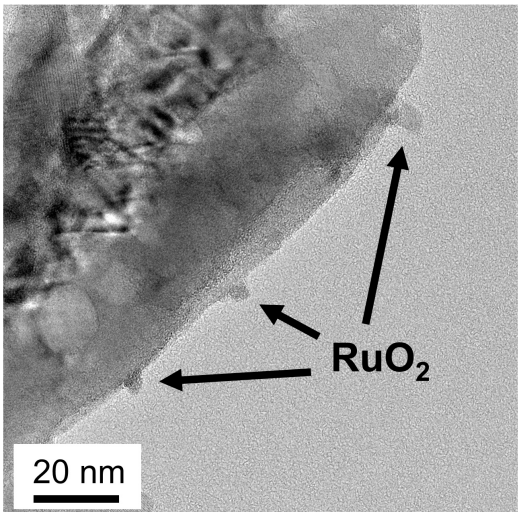

Fig. S7. TEM image of RuO_2/TiO_2:Ta/N.

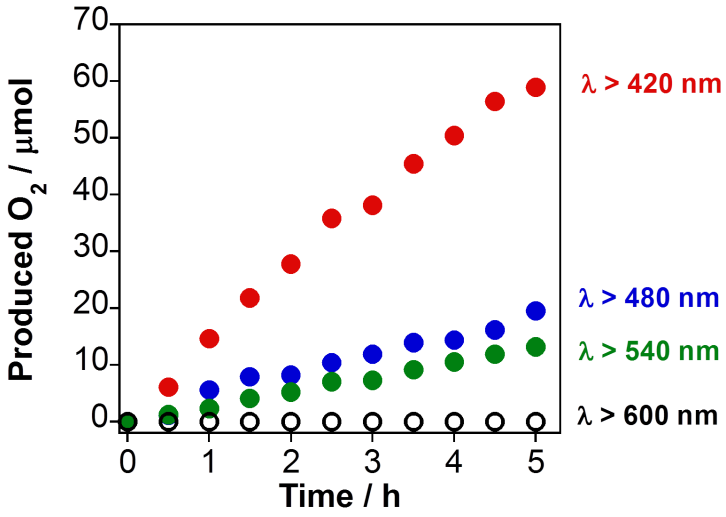

Fig. S8. Time-dependent photocatalytic O_2 evolution over RuO_2/TiO_2:Ta,N(773) dispersed (50 mg) in an aqueous solution (100 mL) of $NaIO_3$ (1 mM) under irradiation at various wavelengths. Output current of the light source was 10 A (300 W, Xe lamp), which was one-half that used for other photocatalytic experiments in this study.

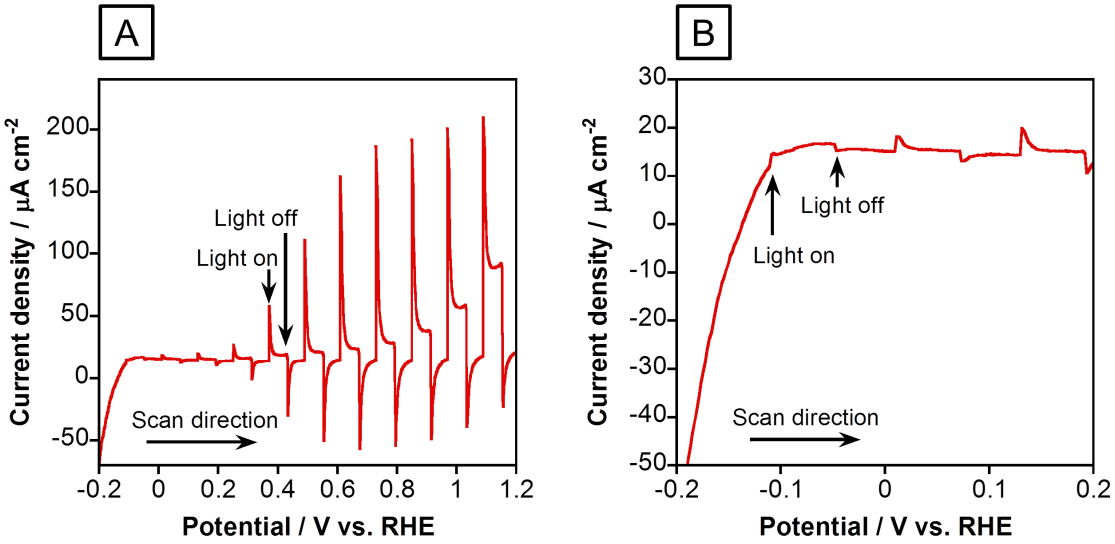

Fig. S9 (A) Current-voltage curves using a RuO_2/TiO_2:Ta/N(773) electrode after $TiCl_4$ necking treatment under intermittent visible-light irradiation in aqueous solution containing Na_2SO_4 (0.1 M, pH 6.7). (B) Enlarged curves of (A) around the onset potential. Scan rate: 20 mV s^{-1}.

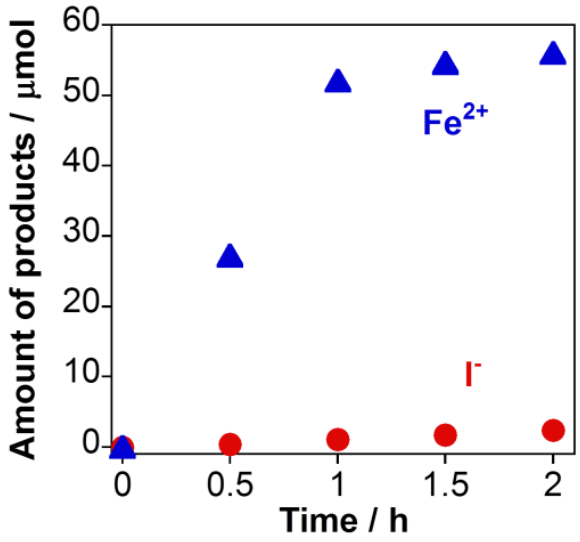

Fig. S10. Time-dependent photocatalytic H_2 evolution over Ru/$SrTiO_3$:Rh dispersed (50 mg) in an aqueous solution (100 mL) of NaI (1 mM, red) or $FeCl_2$ (1 mM, blue) under visible-light irradiation (λ > 420 nm). Saturation of O_2 generation in the Fe^{2+} solution was due to consumption of Fe^{2+}.

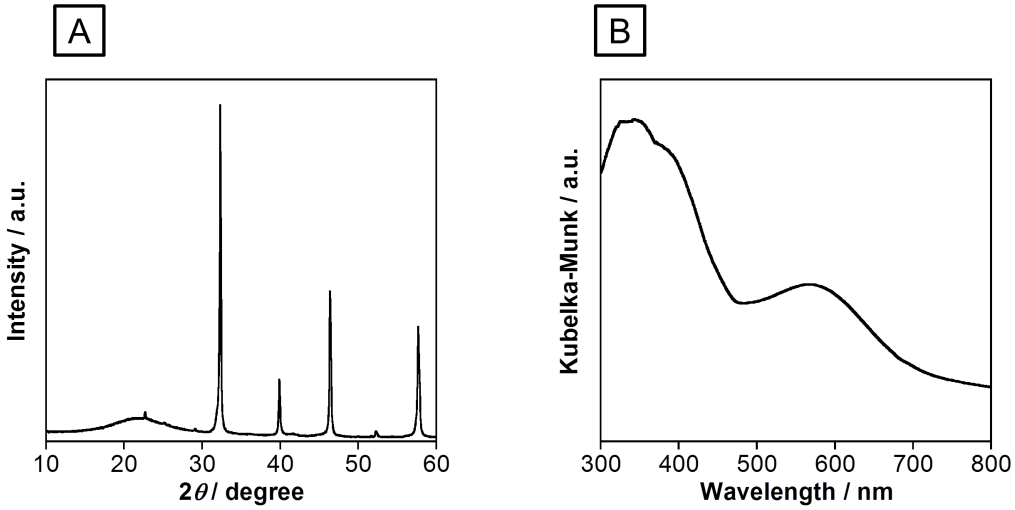

Fig. S11. (A) XRD patterns and (B) DRS of as-prepared $SrTiO_3$:Rh.