Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Electronic Supplementary Information

Effective Strategy for Enhancing Z-scheme Water Splitting with IO_3^-/I^- Redox Mediator by using Visible Light Responsive TaON Photocatalyst Co-loaded with Independently Optimized Two Different Cocatalysts

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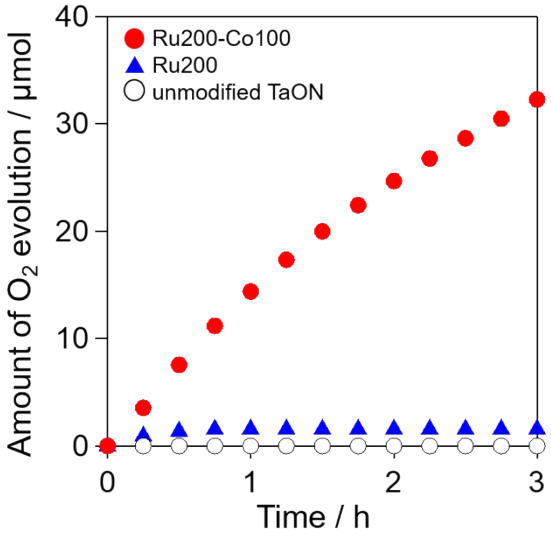

Figure S1. Time courses of photocatalytic oxidation of water on TaON photocatalyst loaded with metal cation species in aqueous solution containing $NaIO_3$ (1 mM) under visible light irradiation (photocatalyst; 50 mg, amount of Milli-Q water; 180 mL, irradiation wavelength; $\lambda > 400$ nm).

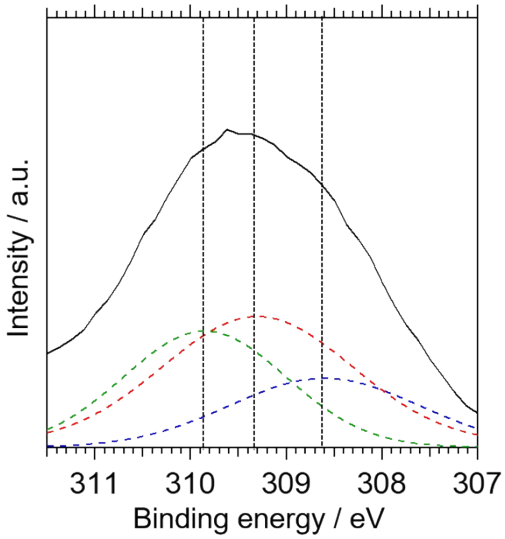

Figure S2. XPS spectrum of $Rh3d_{5/2}$ region for TaON loaded with Rh species prepared by the impregnation followed by calcination at 500 ºC in air (1 wt% as Rh metal). The binding energy of the deposited Au was adjusted to 84.0 eV.

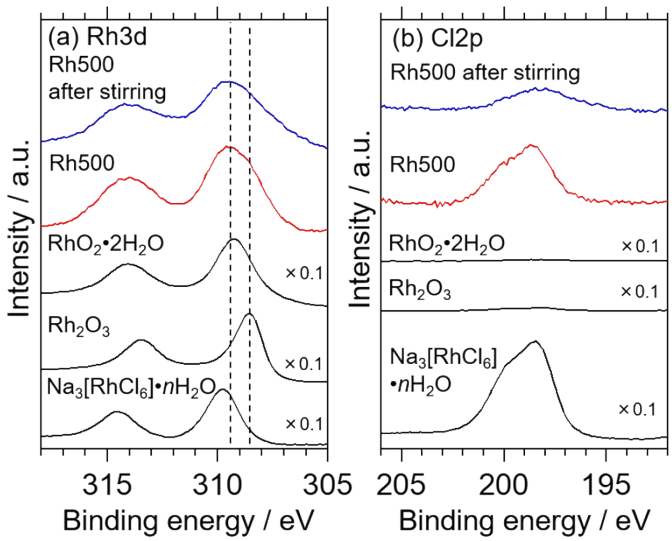

Figure S3. XPS spectra of Rh3d region for TaON loaded with Rh species prepared at 500 ºC and sample after stirring in aqueous solution under dark for 3 h, along with those of RhO_2•$2H_2O$, Rh_2O_3, and $Na_3[RhCl_6]$•nH_2O for comparison. The binding energy of the deposited Au was adjusted to 84.0 eV.

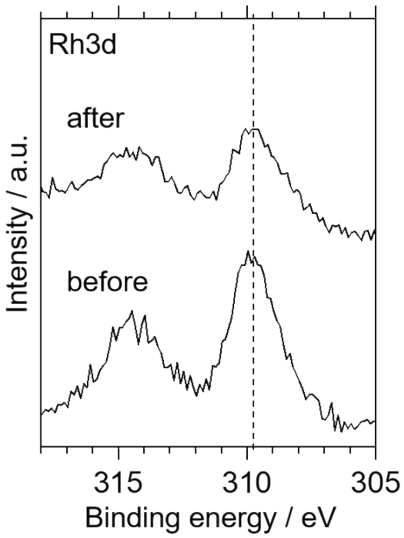

Figure S4. XPS spectra of Rh3d region for Rh500-Ru200 samples before and after reaction. The binding energy of the deposited Au was adjusted to 84.0 eV.

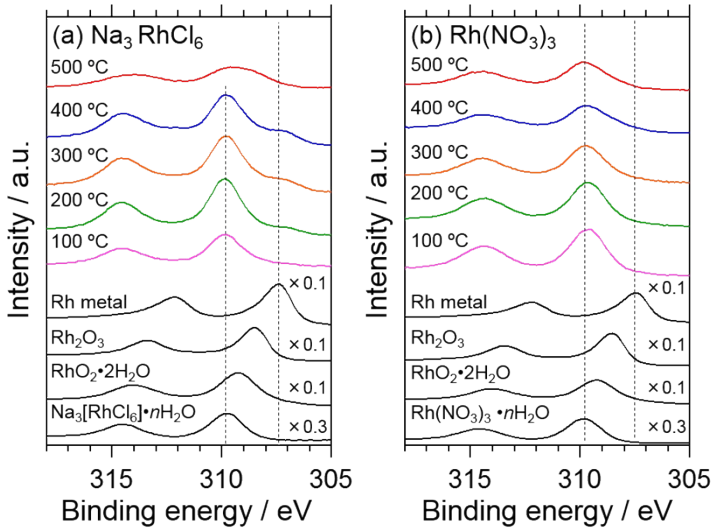

Figure S5. XPS spectra of Rh3d region for TaON samples loaded with Rh species using (a) $Na_3[RhCl_6]•nH_2O$, (b) $Rh(NO_3)_3•nH_2O$ as precursor and those of reference samples. The binding energy of the deposited Au was adjusted to 84.0 eV. The loading of Rh species from $Rh(NO_3)_3•nH_2O$ was carried out in same manner as to that from $Na_3[RhCl_6]•nH_2O$ described in the main text.

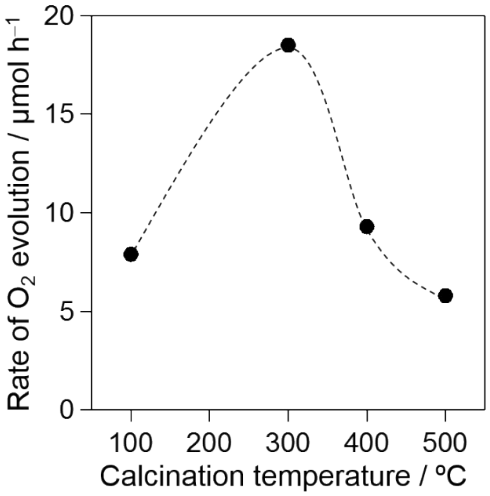

Figure S6. The rate of O_2 evolution on TaON photocatalyst co-loaded with Rh species with $Rh(NO_3)_3 \bullet nH_2O$ at different temperature (100–500 ºC) and Ru species at 200 ºC from aqueous solution containing $NaIO_3$ (1 mM) under visible light irradiation (photocatalyst; 50 mg, amount of Milli-Q water; 180 mL, irradiation wavelength; $\lambda > 400$ nm).

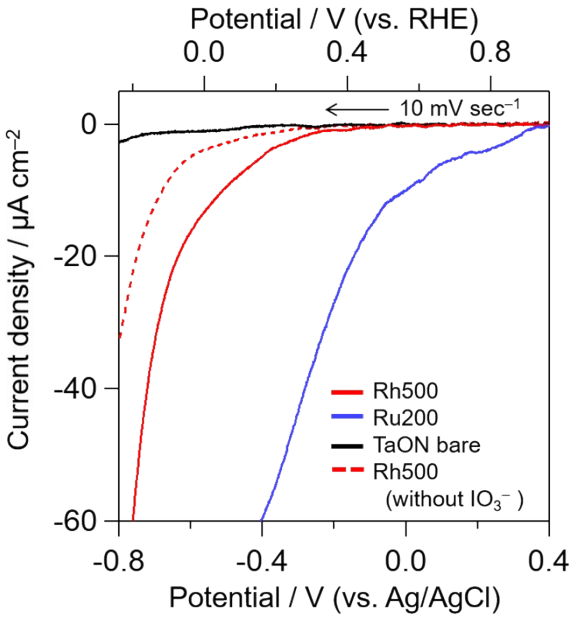

Figure S7. Current-potential curves of TaON electrodes loaded with Rh species, along with those of TaON electrode loaded with Ru species and unmodified TaON electrode in Na_2SO_4 (0.1 M) solution containing $NaIO_3$ (1 mM) under dark.

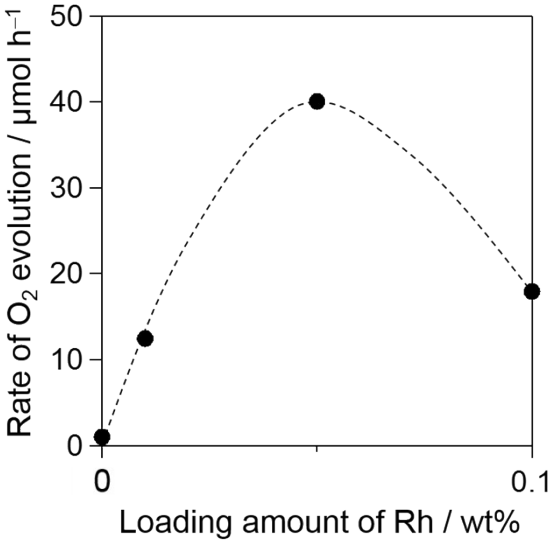

Figure S8. Influence of the loading amount of Rh species on the rate of O_2 evolution on TaON co-loaded with *x* wt% Rh at 500 ºC and 0.1wt% Ru at 200 ºC photocatalysts (50 mg) suspended in an aqueous solution containing $NaIO_3$ (1 mM) with NaI (0.2 mM) under visible light irradiation (amount of water; 180 mL, irradiation wavelength; $\lambda > 400$ nm).

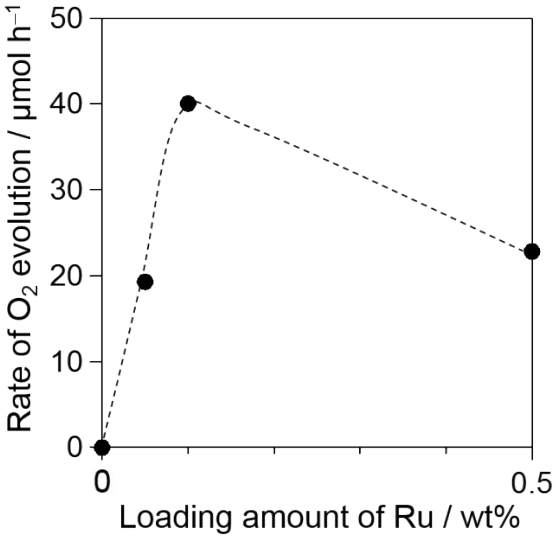

Figure S9. Influence of the loading amount of Ru species on the rate of O_2 evolution on TaON co-loaded with 0.05 wt% Rh at 500 °C and *x* wt% Ru at 200 ºC (50 mg) suspended in an aqueous solution containing $NaIO_3$ (1 mM) with NaI (0.2 mM) under visible light irradiation (amount of water; 180 mL, irradiation wavelength; $\lambda > 400$ nm).