Visible-Light-Driven CO₂ Reduction on a Hybrid Photocatalyst Consisting of a Ru(II) Binuclear Complex and a Ag-Loaded TaON in Aqueous Solutions

Akinobu Nakada, Takuya Nakashima, Keita Sekizawa, Kazuhiko Maeda and Osamu Ishitani*

Department of Chemistry, Graduate School of Science and Engineering, Tokyo Institute of Technology, 2-12-1-NE-1 O-okayama, Meguro-ku, Tokyo 152-8550, Japan.

Supporting Information
**Fig. S1** (a) XRD patterns of RuRu/Ag/TaON (red), Ag/TaON (blue), and TaON (green). (b) Enlarged patterns of (a).

**Fig. S2** Emission spectra of RuRu/Ag/TaON and RuRu in water.
Fig. S3 FT-IR spectra of RuRu/Ag/TaON (red), Ag/TaON (blue), and RuRu (black) in KBr pallets.

Fig. S4 UV-vis absorption spectra of RuRu solution in acetonitrile before (red) and after (blue) soaking with Ag/TaON.
Fig. S5 Emission spectra of RuRu adsorbed on Al₂O₃ (4 mg) in aqueous solution (4 mL) without (black) and with (red) EDTA·2Na (10 mM). The excited wavelength was 444.
Fig. S6 XPS spectra for Ta 4p and N 1s of RuRu/Ag/TaON normalized by the peak area for Ta 4f before (red) and after (blue) photocatalytic reaction corresponding to Table 1, entry 1.

Fig. S7 UV-vis absorption spectra after photocatalytic reaction corresponding to Table 2 entry 1-4, 6, and 11.
Fig. S8 Time-dependent produced amounts of HCHO (red) and HCOOH (blue) via photocatalytic MeOH oxidation over TaON (4mg) in AgNO₃ (10 mM) aqueous solution (4 mL) with a visible-light (λ > 400 nm) irradiation under an Ar atmosphere.