

Supporting Information

Strontium Titanate Based Artificial Leaf Loaded with Reduction and Oxidation Cocatalysts for Selective CO₂ Reduction Using Water as an Electron Donor

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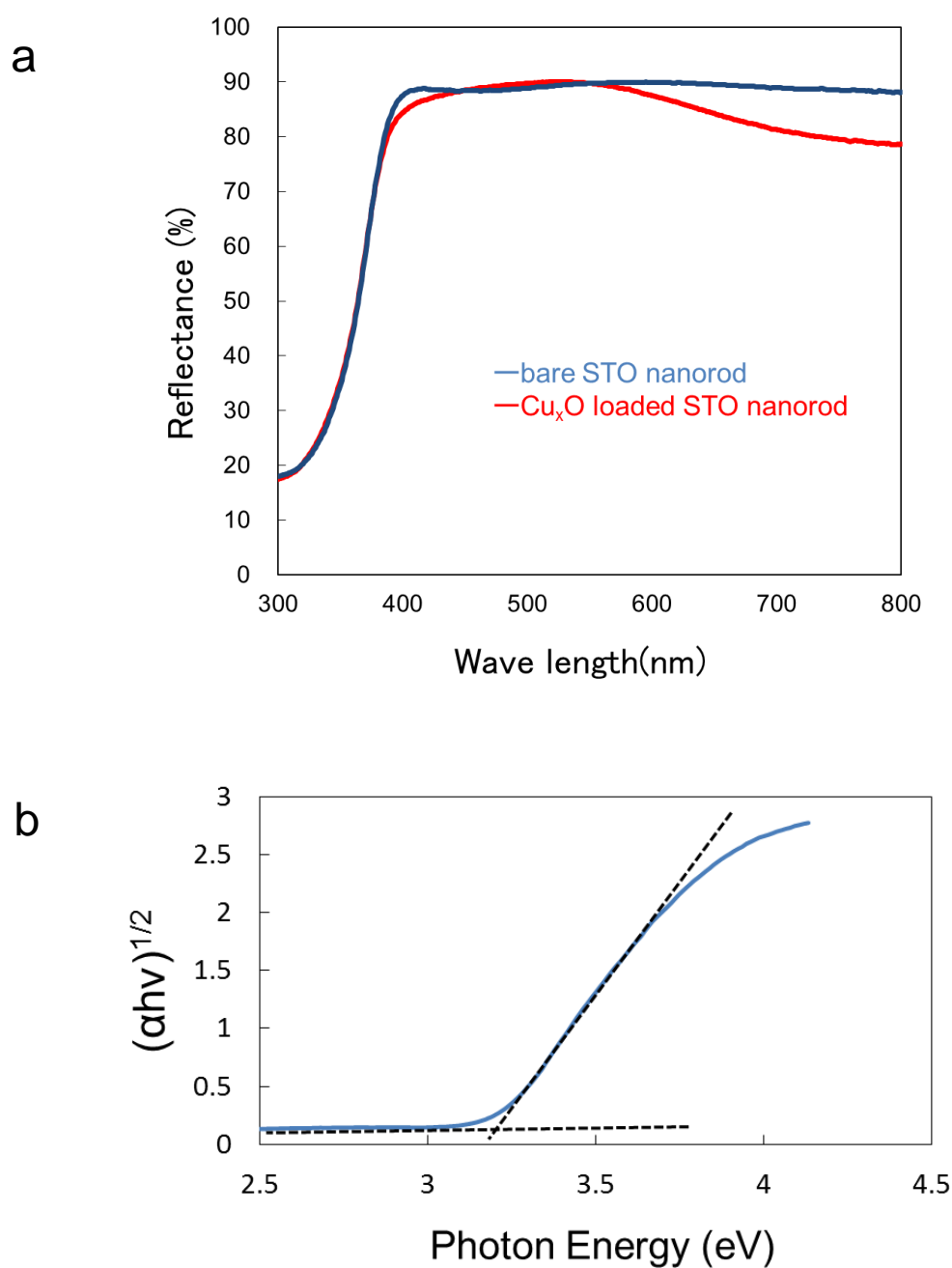


Figure S1. (a)UV-vis diffuse reflectance spectra for Cu_xO-STO (red line) and STO (blue line) nanorod powders synthesized by the annealing of strontium ion-exchanged titanate nanotube powder. Titanate nanotube powder was prepared by the hydrothermal treatment of TiO₂ (P-25) powder. (b)Plot of square root of Absorption coefficient \times $h\nu$ versus photon energy for STO nanorod powder.

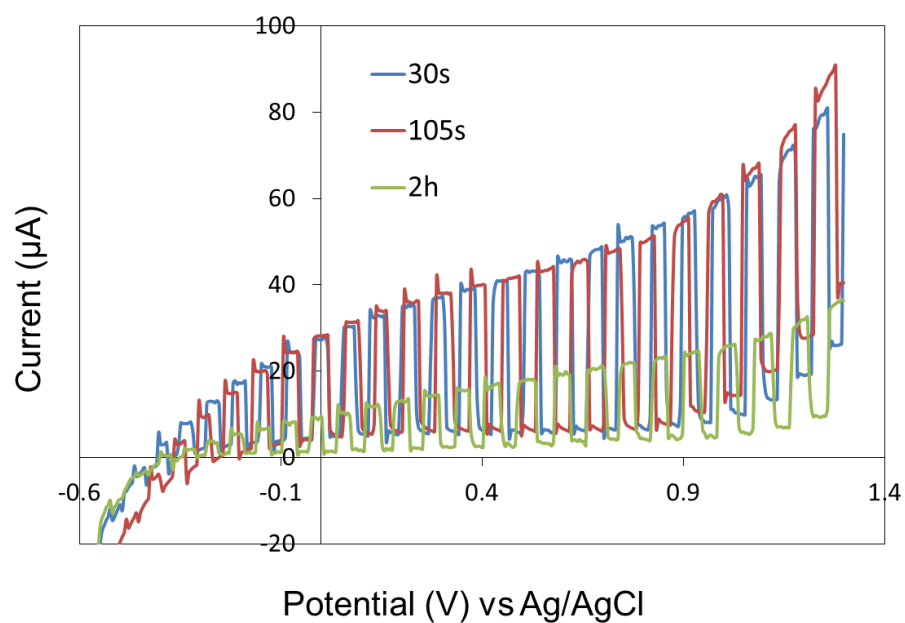


Figure S2. CoPi loading time dependence of photocurrent on the Cu_xO -STO.

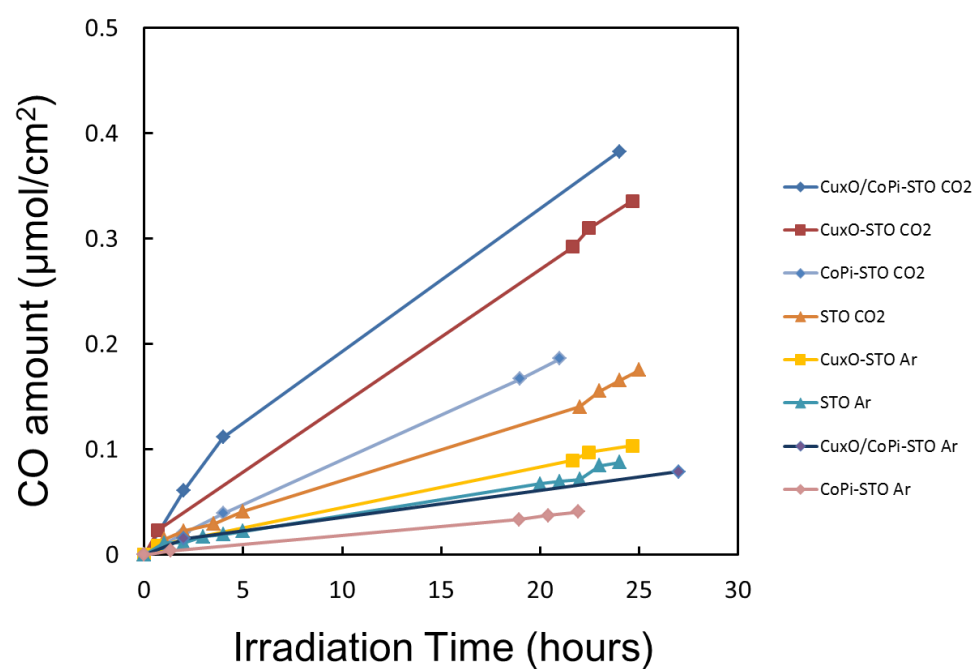
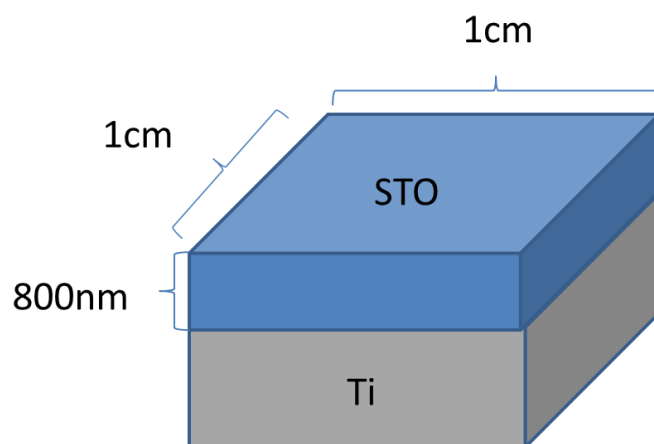


Figure S3. Time course of photocatalytic carbon monoxide (CO) generation by $\text{Cu}_x\text{O}/\text{CoPi-STO}$, $\text{Cu}_x\text{O-STO}$, CoPi-STO , and bare STO films under UV irradiation in CO_2 and Ar atmosphere.



$$\text{Turnover number (24h)} = \frac{\text{CO} = 0.38\mu\text{mol}}{\text{STO} = 9.0 \times 10^{-2}\mu\text{mol}} = 4.2$$

Figure S4. Calculation of turnover number on $\text{Cu}_x\text{O}/\text{CoPi}$ -STO nanorod thin film.

Turnover number (TON) was calculated by the amount of products divided by catalyst amount. In the present study, we could not determine the exact density of our STO films, then we assumed the 100 % dense STO film for calculation to avoid the overestimation of TON. And as a result, the estimated TON exceeded 4 even under the assumption of dense STO film. As shown in Figure 6, CO generation rate was linearly increased even after 24 hours irradiation, suggesting that the TON is higher than the estimated value. Further, our STO film is porous and actual reaction sites are mostly located at the nano-sized cocatalysts, then the expected TON would be much higher than the estimated value. It is noted that the nano-structure of STO film was not changed even after the photocatalysis test, also proving the high stability of our photocatalyst.