

Supplemental Document: “Photocatalytic Conversion of CO₂ to Hydrocarbon Fuels via Plasmon-Enhanced Absorption and Metallic Interband Transitions”

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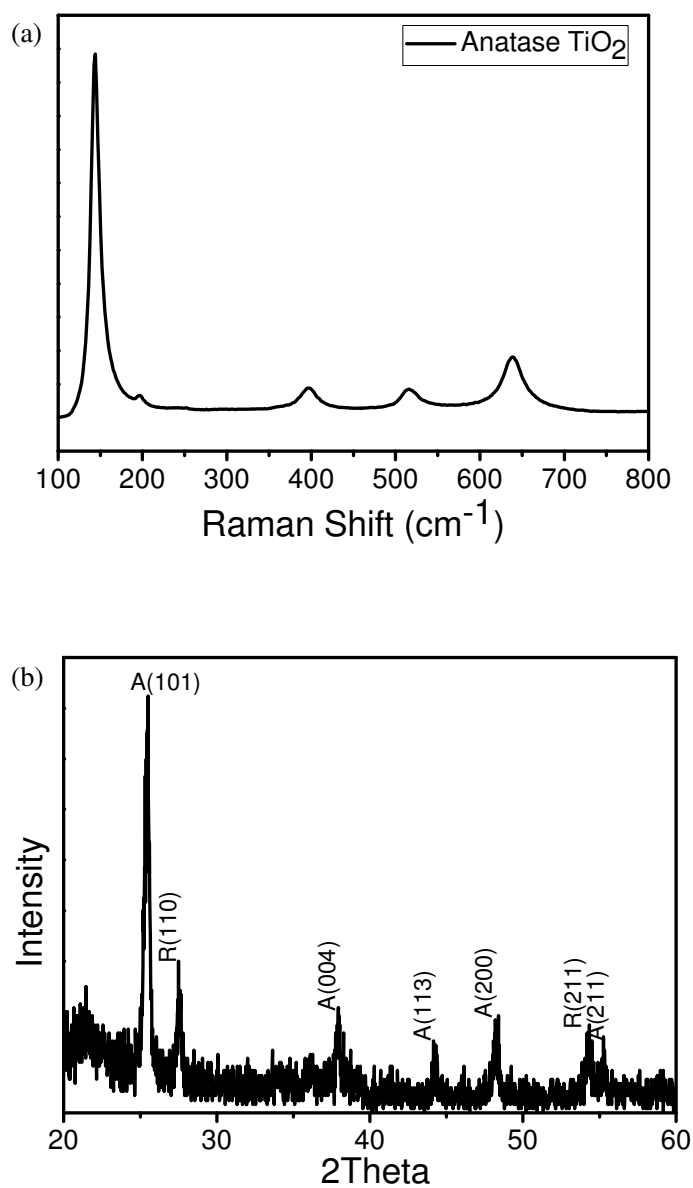


Figure S1. (a) Raman spectrum and (b) XRD profile of sol-gel TiO₂.

The Raman spectrum and XRD profile shown in Figure S1 indicate the anatase crystalline phase of the sol-gel prepared TiO_2 material. Weak reflections in the XRD data corresponding to the (110) and (211) planes of the rutile crystalline phase indicate that a small amount of rutile TiO_2 is present in the sample.

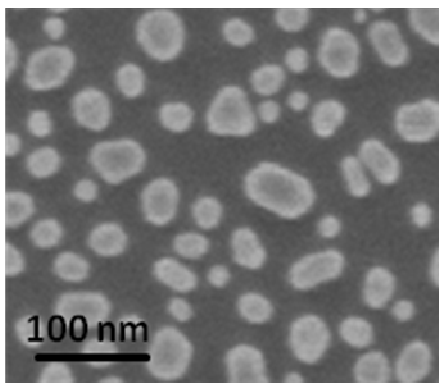


Figure S2. SEM image of 5 nm Au thin film after the second annealing.

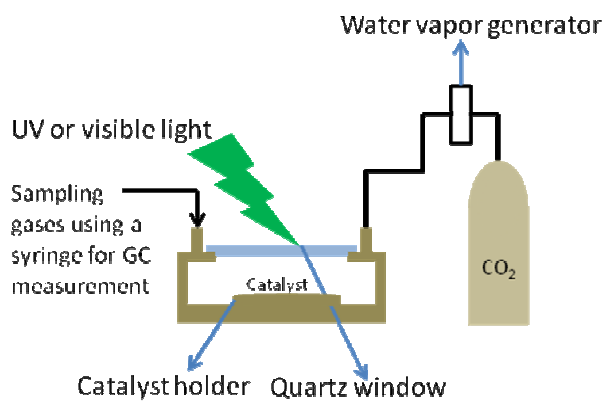


Figure S3. Schematic diagram of experimental setup.

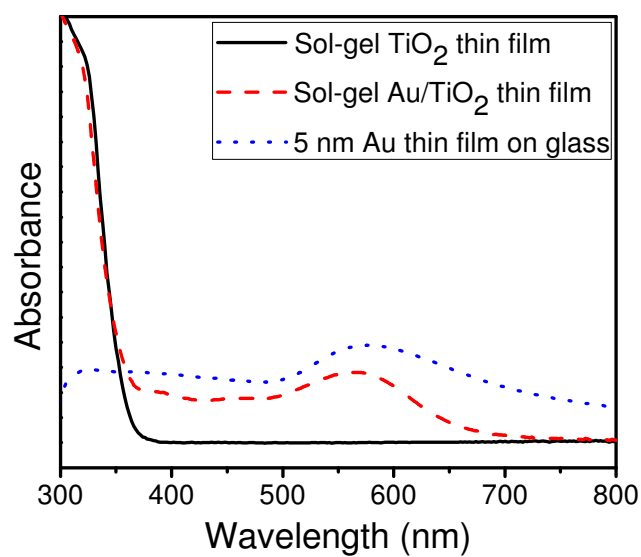


Figure S4. UV-vis absorption spectra of TiO₂ with and without gold nanoparticles and gold nanoparticles deposited on glass by electron-beam evaporation.

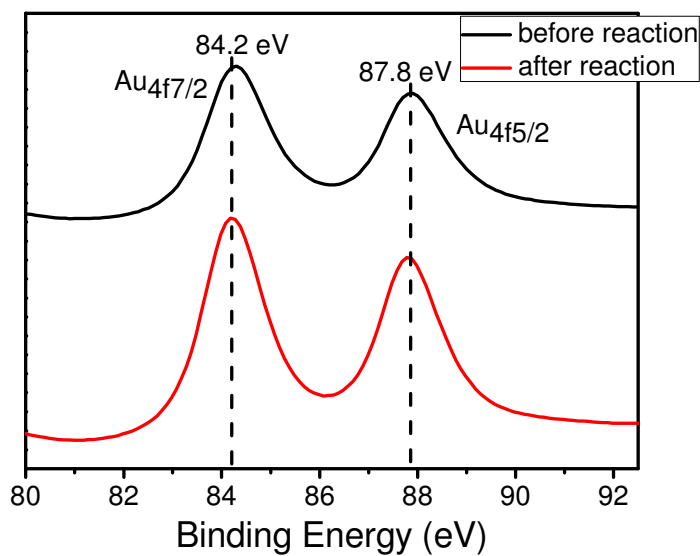


Figure S5. X-ray photoelectron spectra (XPS) of Au/TiO₂ sample before and after reactions.

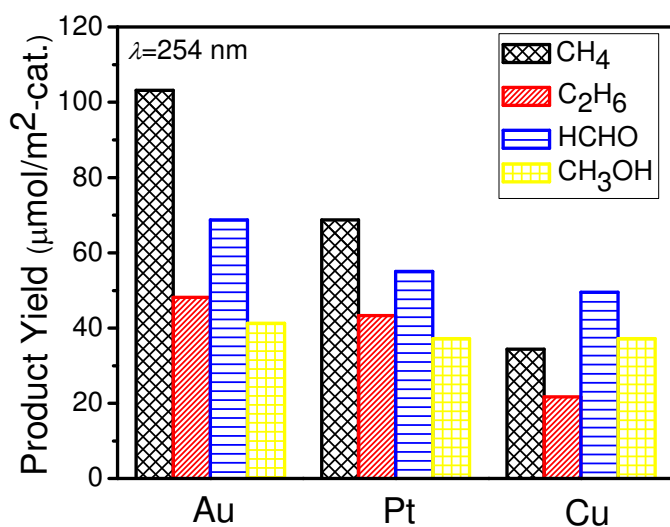
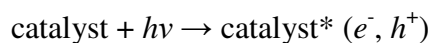
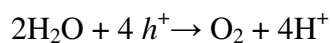


Figure S6. Photocatalytic product yields of 5 nm Pt on glass and a Cu foil compared with that of 5 nm Au on glass.

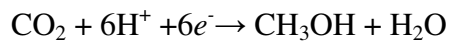
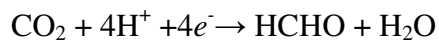
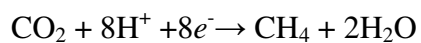
The photocatalytic reactions are considered to occur by the following schemes.¹



for oxidation



for reduction



References

1. Inoue, T.; Fujishima, A.; Konishi, S.; Honda, K., Photoelectrocatalytic Reduction of Carbon-Dioxide in Aqueous Suspensions of Semiconductor Powders. *Nature* **1979**, 277, (5698), 637-638.