

Supporting Information

Calculation for apparent quantum yield (AQY)

$$\begin{aligned} \text{AQY} &= \frac{\text{output of H}_2 \text{ per second}}{\text{input power}} \\ &= \frac{\text{no. of H}_2 \text{ generated per second} \times 2}{\text{no. of incident photons per second}} \end{aligned}$$

The apparent quantum yield (AQY) of Cu/TiO₂-1.6 is calculated using the equation below.

The optimal AQY of Cu/TiO₂-1.6 is calculated using photocatalyst amount of 5 mg and the H₂ production rate was found to be 13.5 mmolg⁻¹h⁻¹. The light source used is an UV LED (365 nm) with light intensity of 125 mW. From the equation, the AQY was calculated to be 9.82 % for the Cu/TiO₂-1.6.

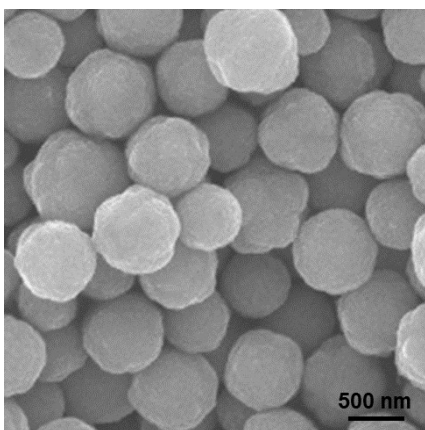


Fig. S1 SEM image of CuO

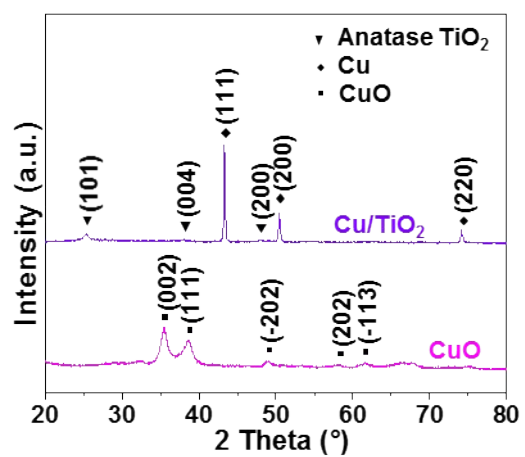


Fig. S2 XRD of CuO and Cu/TiO₂ before and after hydrothermal treatment respectively

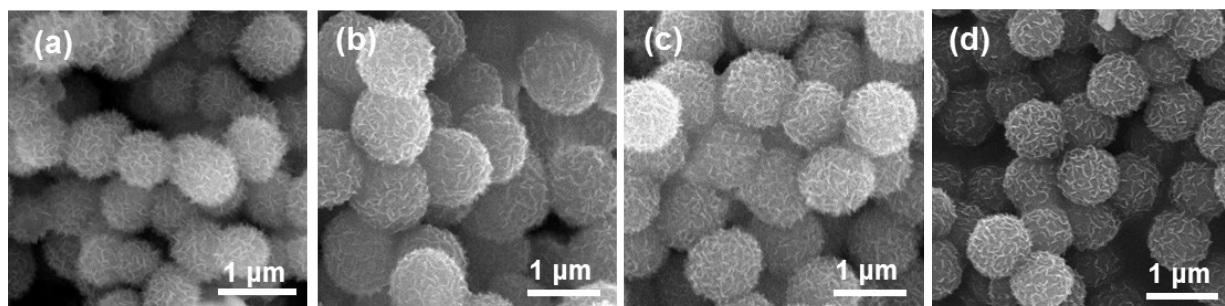


Fig. S3 SEM images of Cu/TiO₂-1, Cu/TiO₂-1.3, Cu/TiO₂-1.6, Cu/TiO₂-1.9

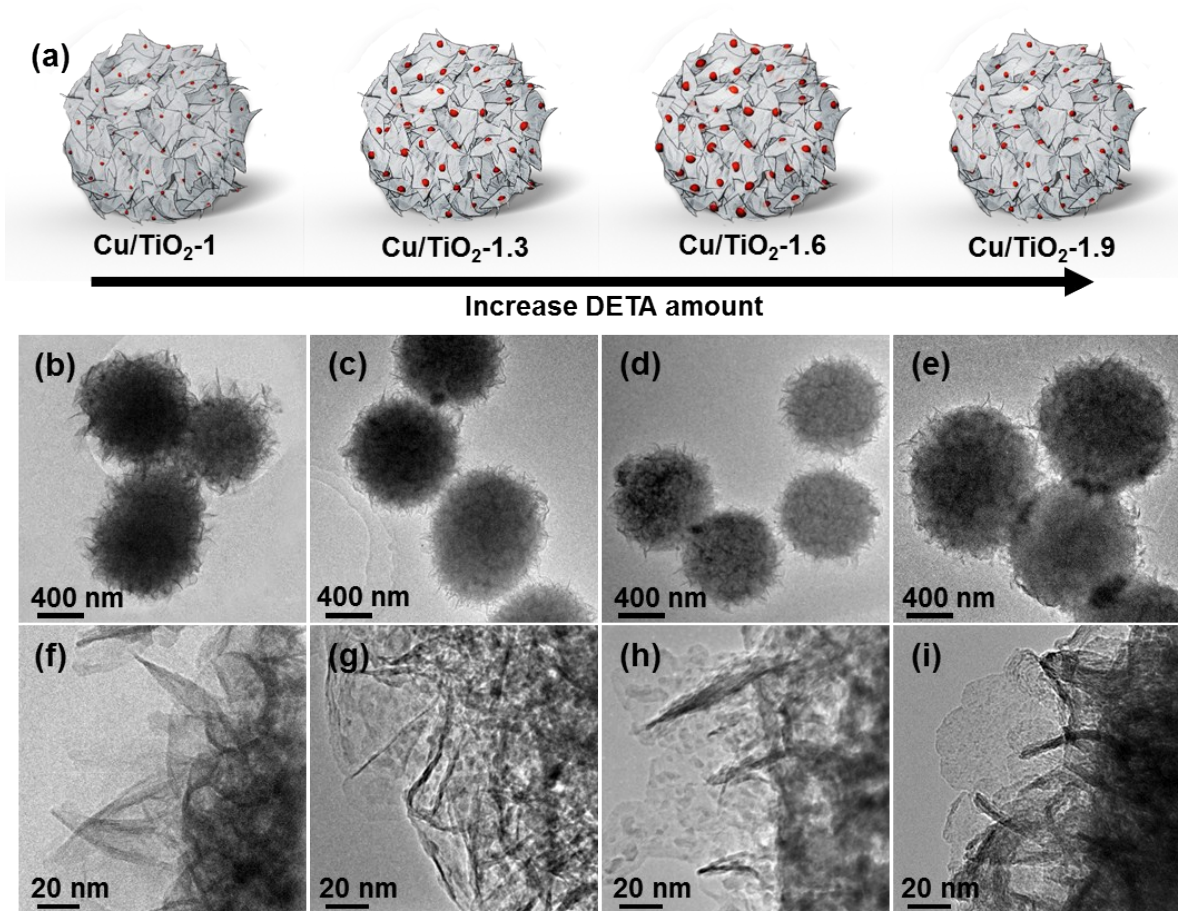


Fig. S4 (a) Schematic of Cu/TiO₂-1, Cu/TiO₂-1.3, Cu/TiO₂-1.6, Cu/TiO₂-1.9, (b - e) TEM images and (f - i) High magnification TEM images of Cu/TiO₂-1, Cu/TiO₂-1.3, Cu/TiO₂-1.6, Cu/TiO₂-1.9 respectively

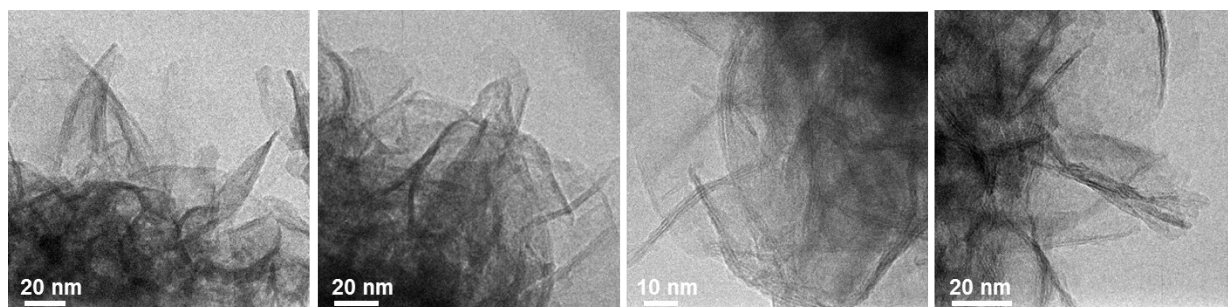


Fig. S5 High magnification TEM images of Cu/TiO₂-1

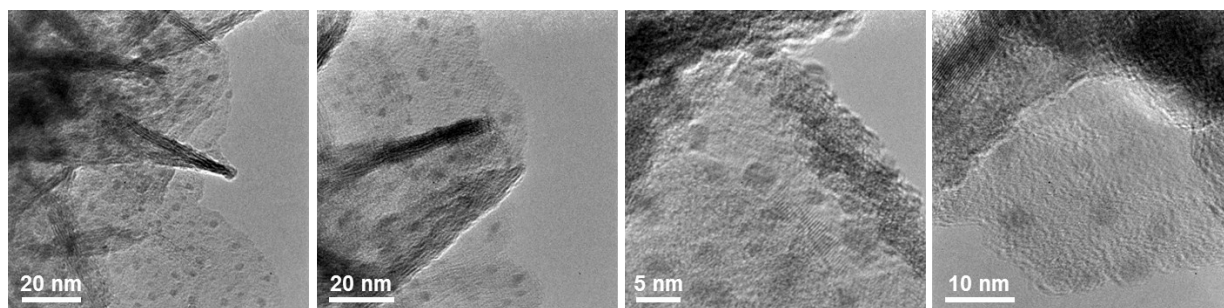


Fig. S6 High magnification TEM images of Cu/TiO₂-1.3

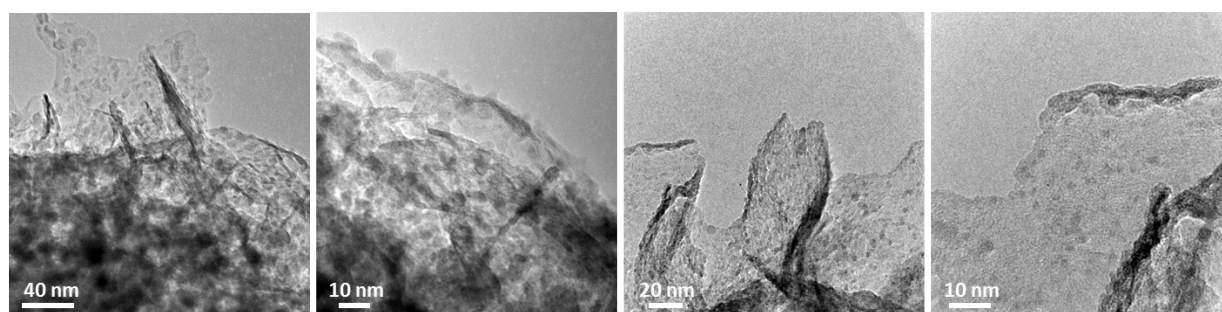


Fig. S7 High magnification TEM images of Cu/TiO₂-1.6

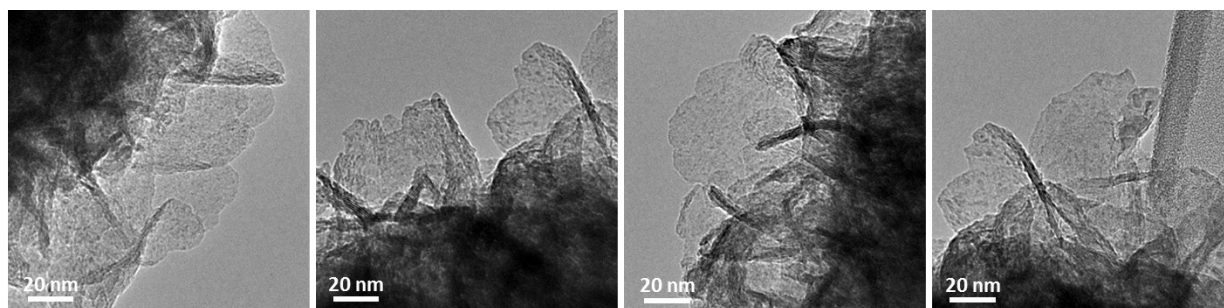


Fig. S8 High magnification TEM images of Cu/TiO₂-1.9

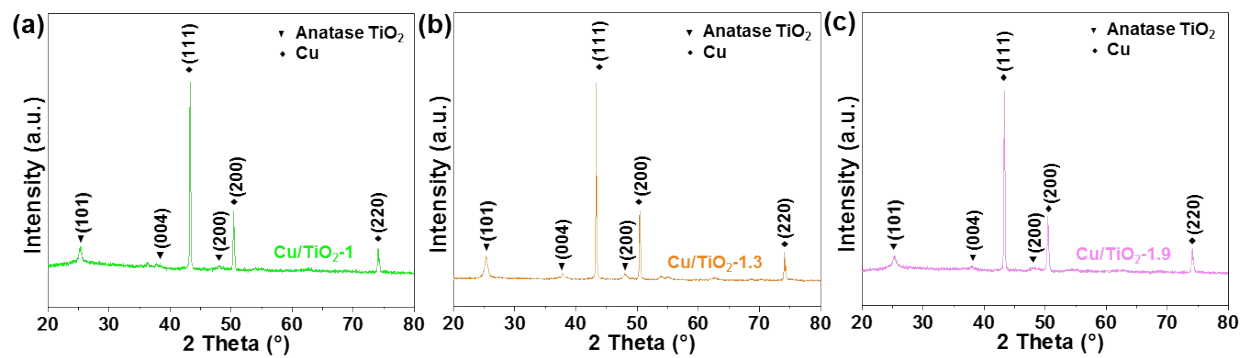


Fig. S9 XRD of (a) Cu/TiO₂-1, (b) Cu/TiO₂-1.3, (c) Cu/TiO₂-1.9

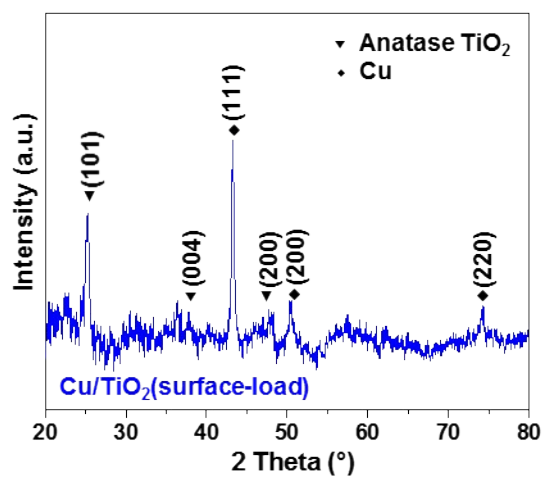


Fig. S10 XRD of Cu/TiO₂(surface-load)

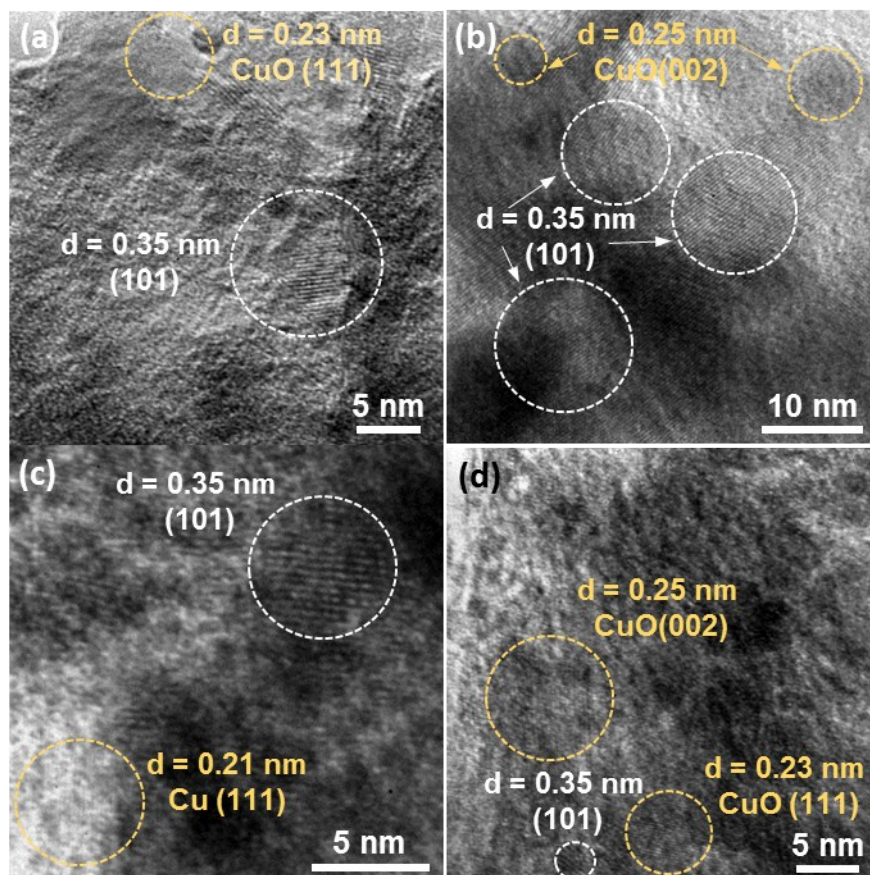


Fig. S11 TEM images of Cu/TiO₂-1.6 after 2 months in ambient environment

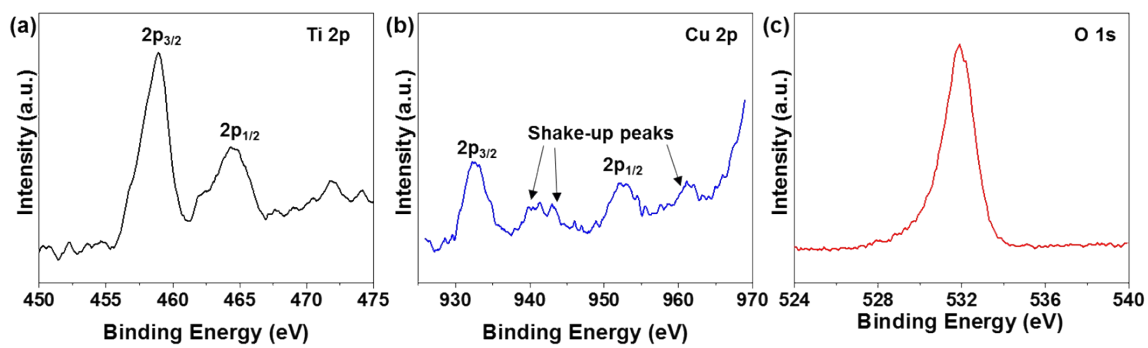


Fig. S12 XPS spectrum of Cu/TiO₂-1.6

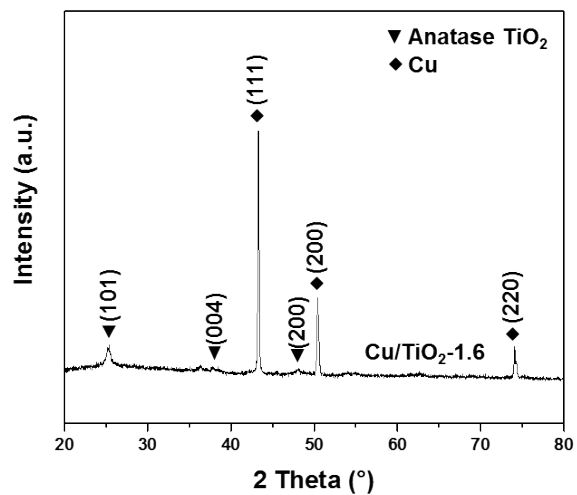


Fig. S13 XRD of Cu/TiO₂-1.6 after two months in ambient environment

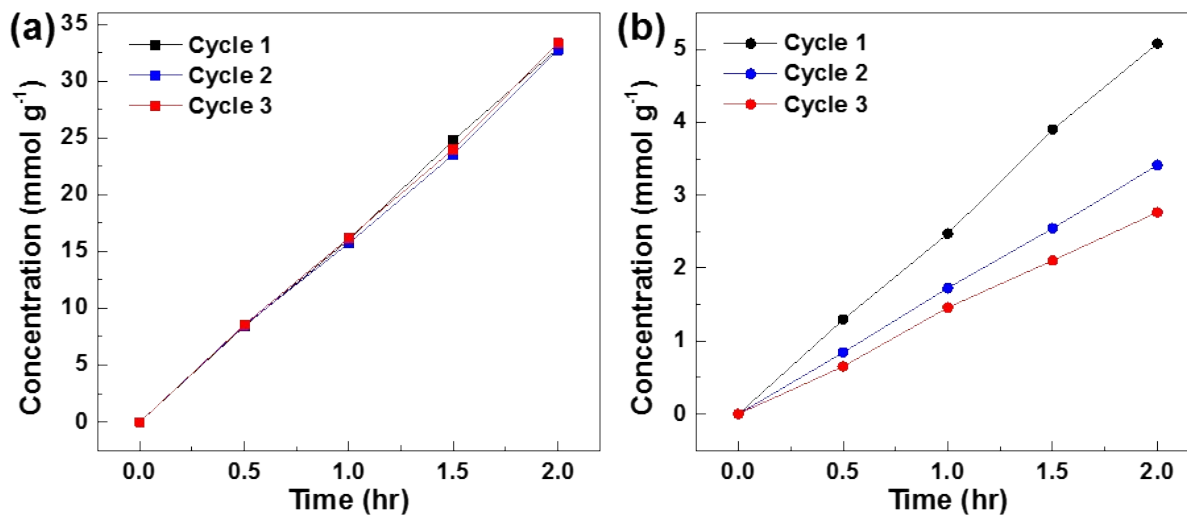


Fig. S14 H₂ production cycling test for (a) Cu/TiO₂-1.6 and (b) Cu/TiO₂(surface-load) after 2 months in ambient environment

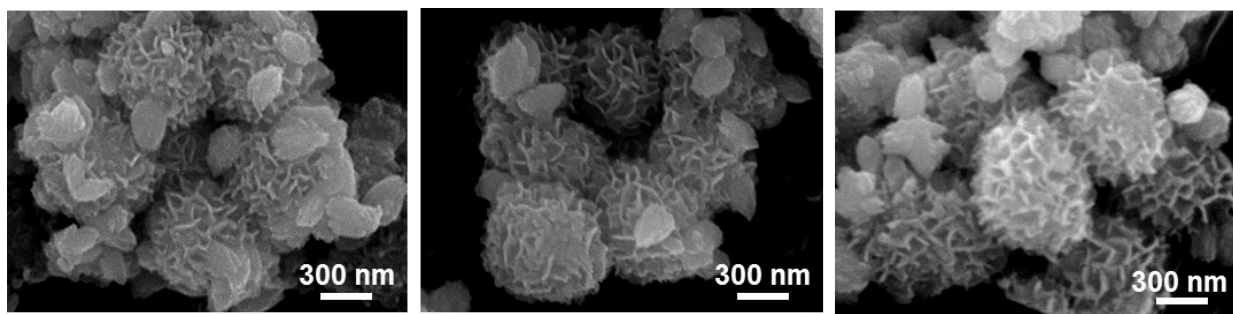


Fig. S15 SEM images of Cu/TiO₂(surface-load) after 2 months in ambient environment