

Electronic Supplementary Information (ESI)

for

On the mechanism of photocatalytic reactions on $\text{Cu}_x\text{O}@\text{TiO}_2$ core-shell photocatalyst

by

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1. STEM observations of $\text{Cu}_x\text{O}@\text{TiO}_2$ samples prepared by microemulsion method

STEM images for $\text{Cu}_x\text{O}@\text{TiO}_2$ samples containing 2%, 5% and 50% of Cu_xO are shown in Figures S1, S2 and S3, respectively. It is clear that in the case of 50 wt% $\text{Cu}_x\text{O}@\text{TiO}_2$ sample, cuprous oxide was only partly covered with TiO_2 .

Distributions of: size of aggregated titania (bare TiO_2 forming aggregates in all samples), size of Cu_xO core and thickness of titania shell after counting of 55-120 particles are shown in Fig. S4.

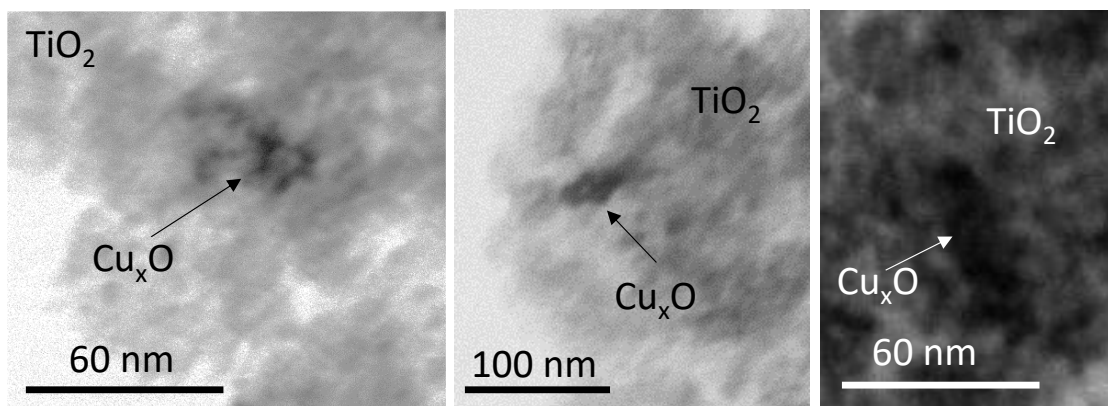


Fig. S1 STEM images of 2% $\text{Cu}_x\text{O}@\text{TiO}_2$ sample.

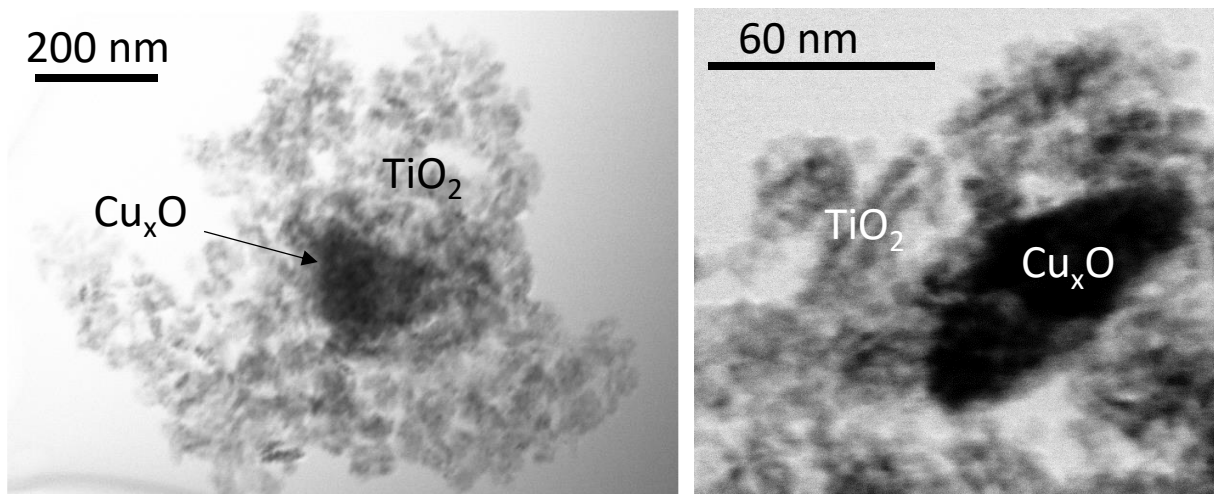


Fig. S2 STEM images of 5% $\text{Cu}_x\text{O}@TiO_2$ sample.

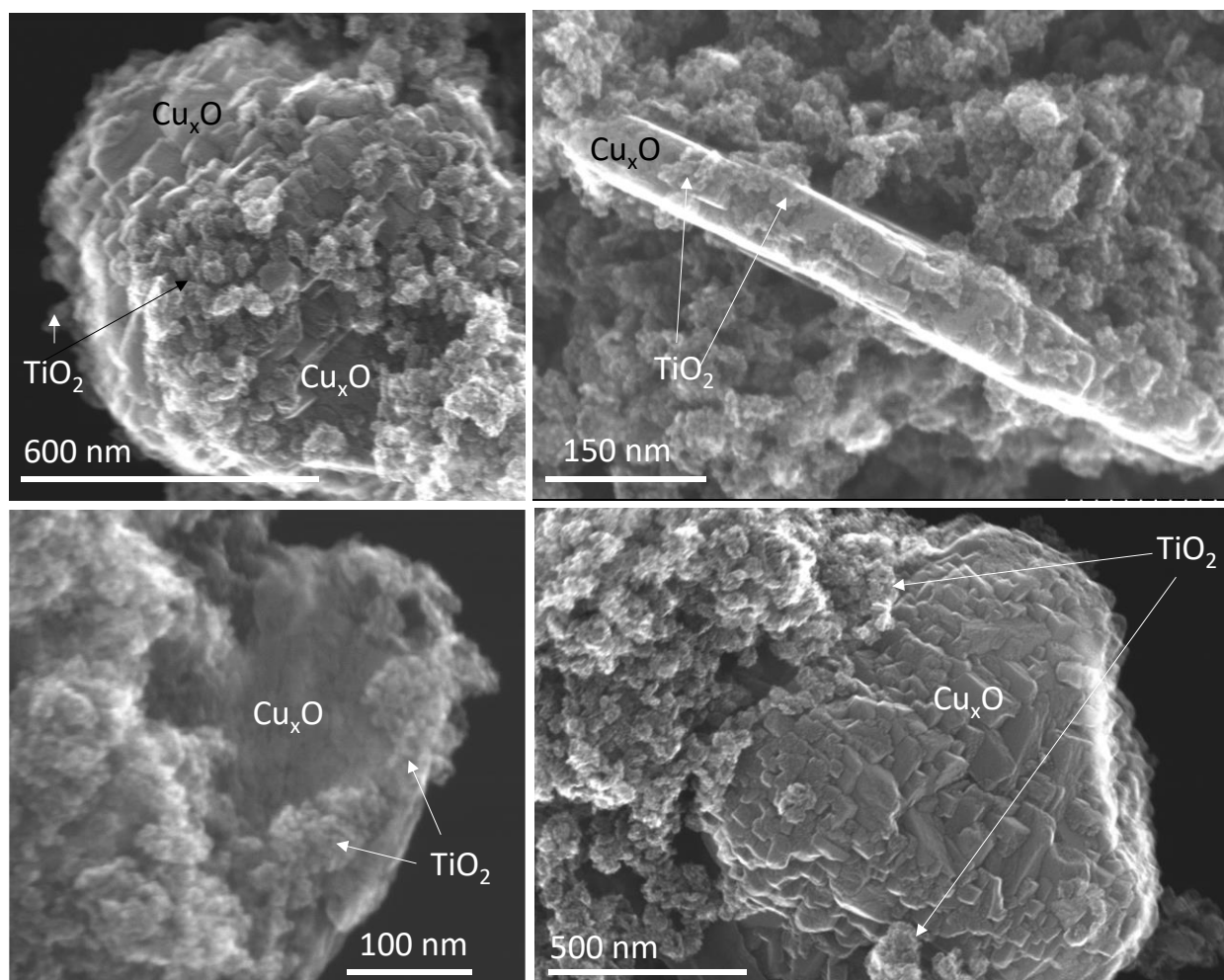


Fig. S3 SEM images of 50% $\text{Cu}_x\text{O}@TiO_2$ sample.

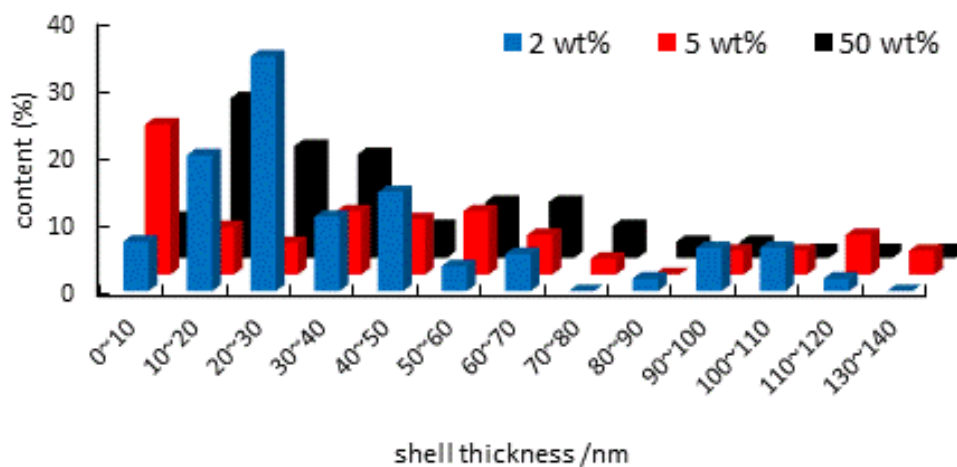
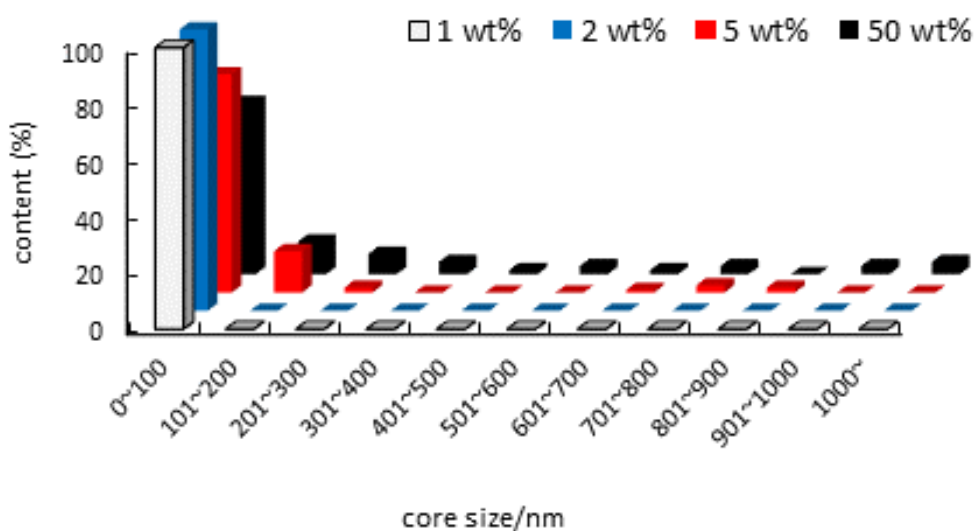
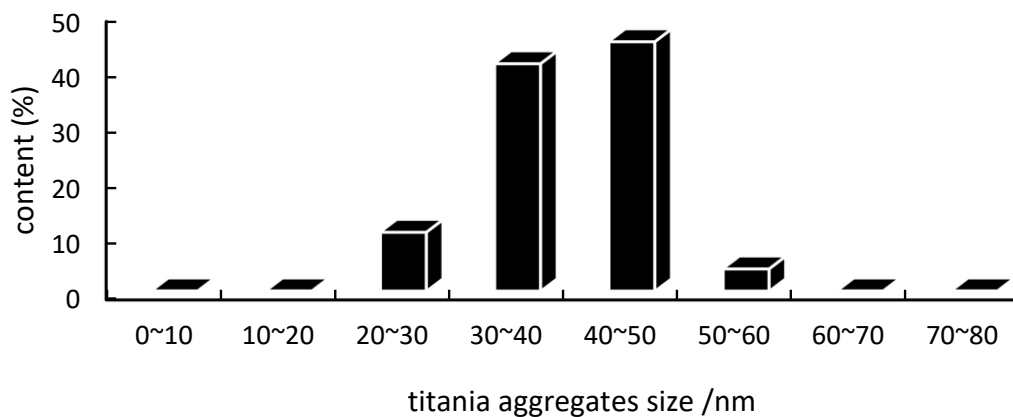


Fig. S4 Distributions of: (top) size of titania aggregates in all samples (as bare TiO₂), (center) Cu_xO core size, and (bottom) titania shell thickness in Cu_xO@TiO₂ samples (For 50% Cu_xO@TiO₂ sample, there is no “shell” since the core (Cu_xO/Cu₂O) was not completely covered with titania.).

2. Photocatalytic activity tests in the presence of scavengers

Oxidative decomposition of acetic acid for 5% Cu_xO@TiO₂ sample was performed also in the presence of different scavengers, i.e., Cr(VI), isopropanol, KI and TEMPOL (4-hydroxy-2,2,6,6-tetramethylpiperidin 1-oxyl) to check the participation of different species in the decomposition of acetic acid, i.e., photogenerated electrons (e⁻), hydroxyl radicals (OH[•]), holes (h⁺) and superoxide radical anions (O₂^{•-}), respectively. Prior to irradiation, 0.5 mL of respective scavenger was added to the testing tube, i.e., 0.01 K₂CrO₄, 25 mM isopropanol, 0.25 mM KI and 1 mM TEMPOL. The obtained data are shown in **Fig. S5**.

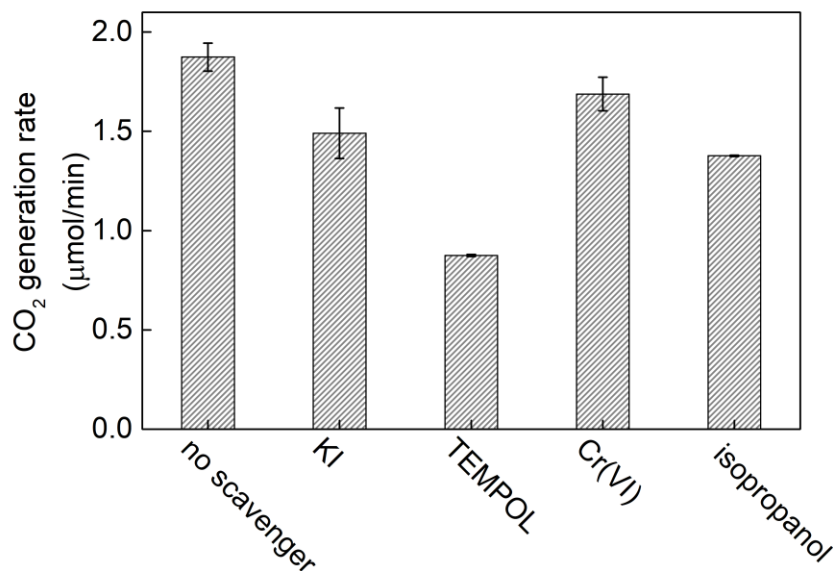


Fig. S5 Photocatalytic activity of 5 wt% Cu_xO@TiO₂ sample for oxidative decomposition of acetic acid under UV/vis irradiation in the absence (“no scavenger”) and the presence of various scavengers, i.e., Cr(VI), isopropanol, KI and TEMPOL.