

**Copper and sulphur co-doped titanium oxide nanoparticles with enhanced catalytic
and photocatalytic properties**

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Supplementary Material

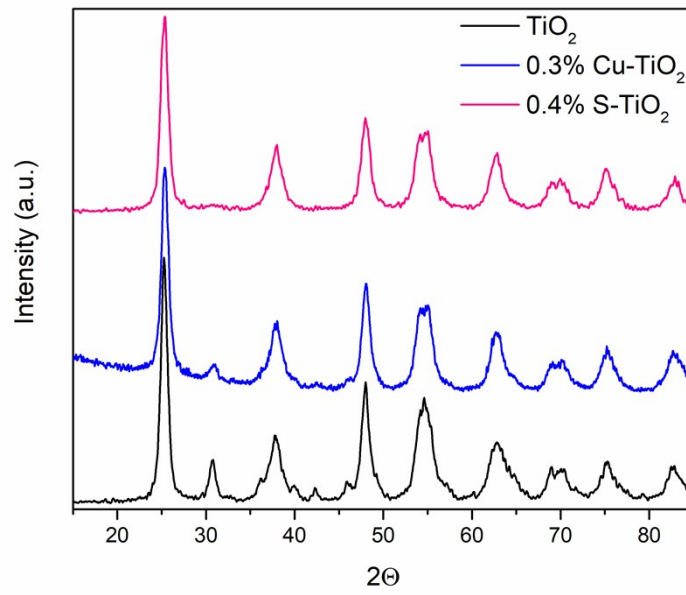


Fig. S1. XRD patterns of TiO_2 , 0.4% S-TiO_2 and 0.3% Cu-TiO_2 samples

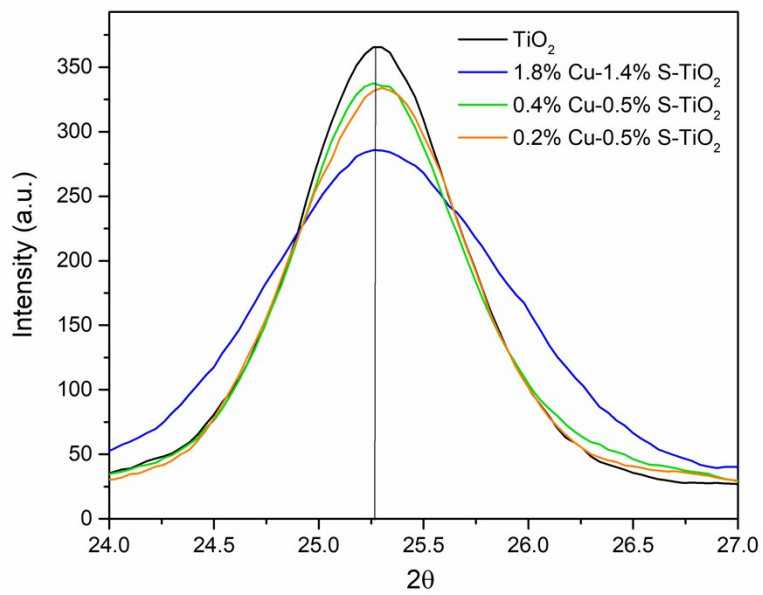
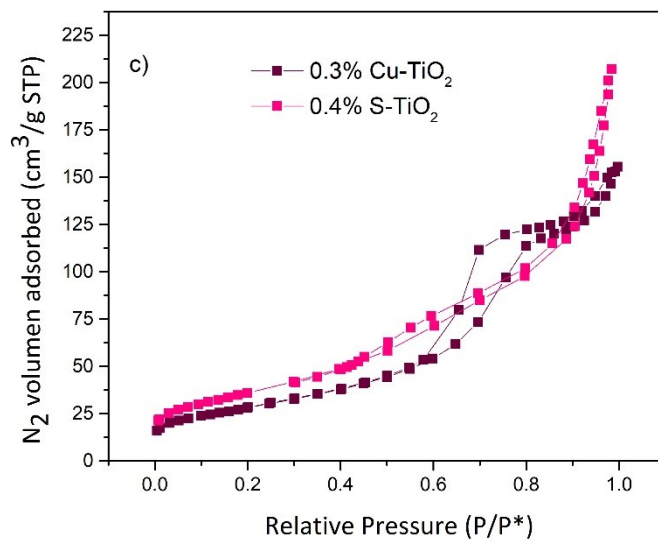
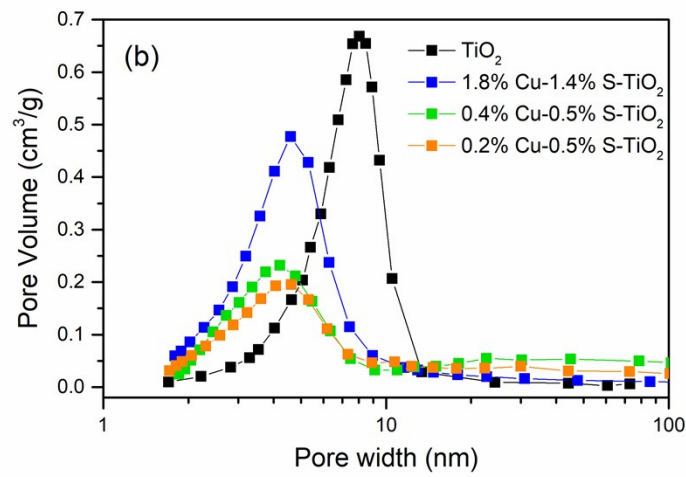
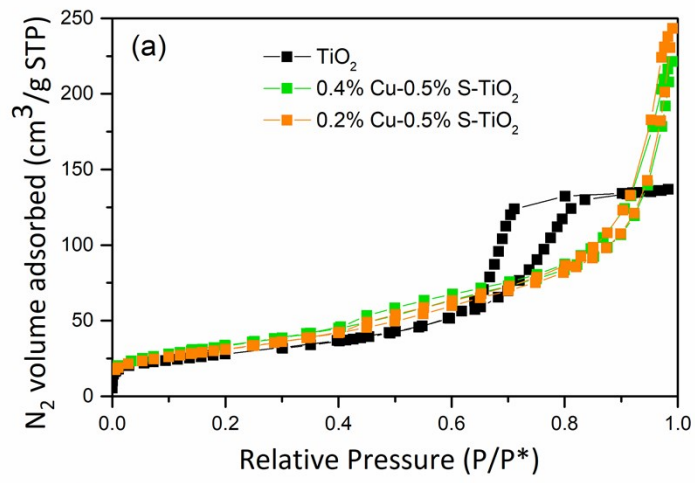


Fig. S2. XRD peak of (101) reflection for TiO_2 samples



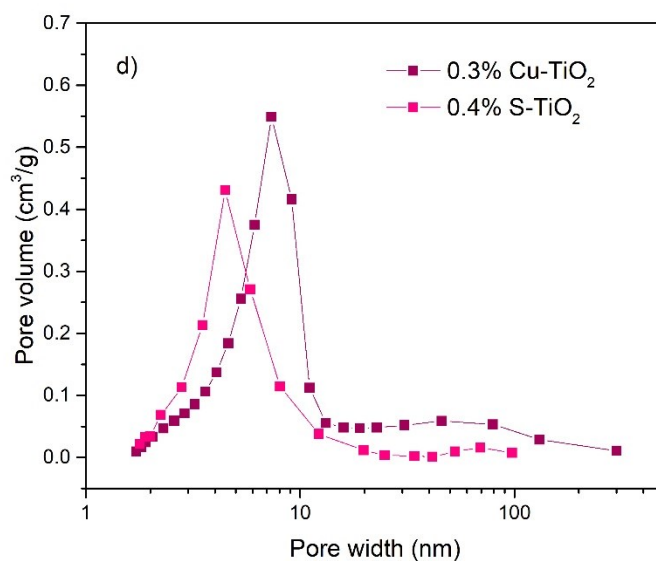


Fig. S3. a) N_2 isotherms of bare TiO_2 and Cu,S co-doped TiO_2 samples b) pore size distribution of bare TiO_2 and Cu,S co-doped TiO_2 samples (c) N_2 isotherms of Cu- TiO_2 and S- TiO_2 samples and (d) pore size distribution of Cu- TiO_2 and S- TiO_2 samples.

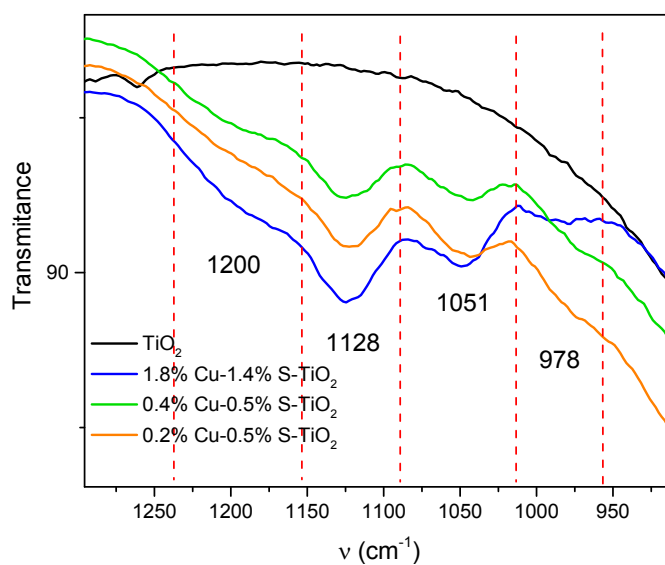


Fig. S4. Zoom in FTIR spectra between 900-1300 cm^{-1} .

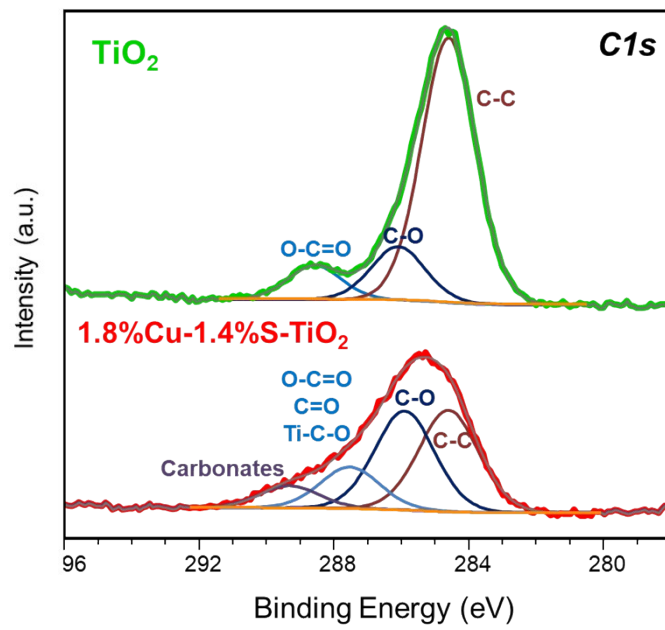


Fig. S5. C1s XPS signal for bare TiO₂ and co-doped TiO₂ nanoparticles.

Table S1. Restrictions applied in the O1s XPS peak fitting.

Sample	Parameter	Restriction
1.8%Cu-1.4%S-TiO ₂	Peak position (eV)	Ti ^{IV} -O = [529.5, 530]
1.8%Cu-1.4%S-TiO ₂	Peak position (eV)	Ti ^{III} -O = Ti ^{IV} -O(same sample) ± 0.8
1.8%Cu-1.4%S-TiO ₂	Fwhm (eV)	Ti ^{IV} -O = Ti ^{IV} -O (bare TiO ₂)
Both	Fwhm (eV)	Ti-OH, O _v , sulfate, carboxylate, water = 1.1 x Ti ^{IV} -O
1.8%Cu-1.4%S-TiO ₂	Fwhm (eV)	Ti ^{III} -O = Ti ^{IV} -O

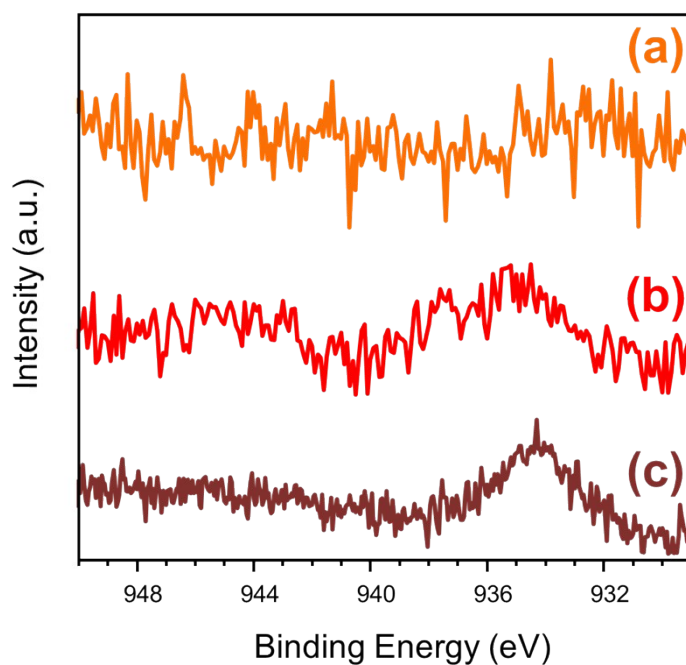


Fig. S6. Comparison of XPS Cu₂p_{3/2} recorded signal for 1.8%Cu-1.4%S-TiO₂ with (a) 1 scan analysis, (b) 25 scan analysis, (c) 30 scan analysis.

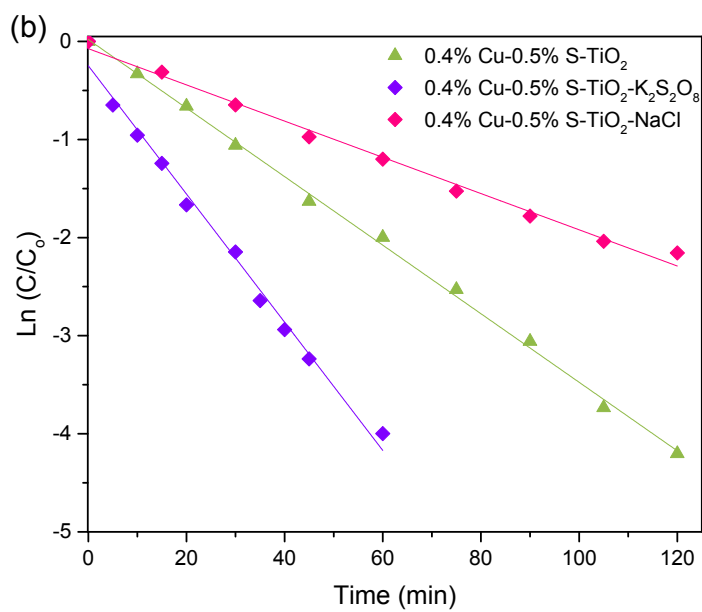
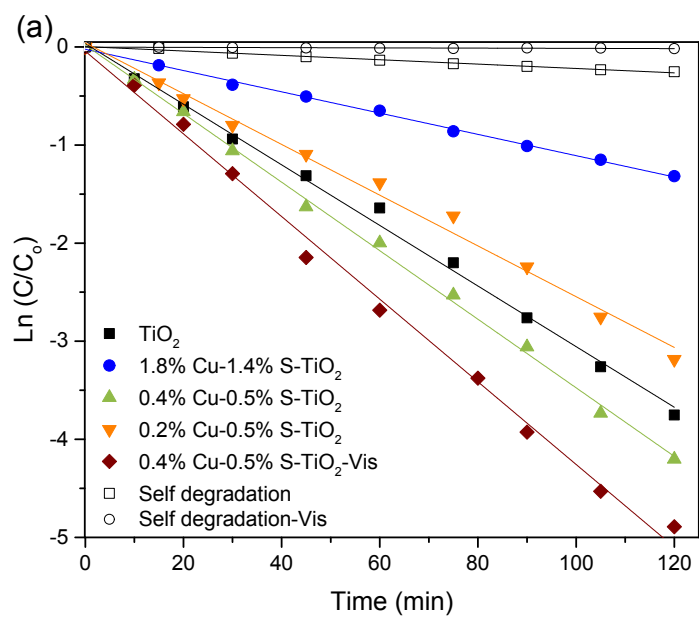


Fig. S7. Photocatalytic degradation of CIP using TiO₂ and Cu-S-doped TiO₂ samples

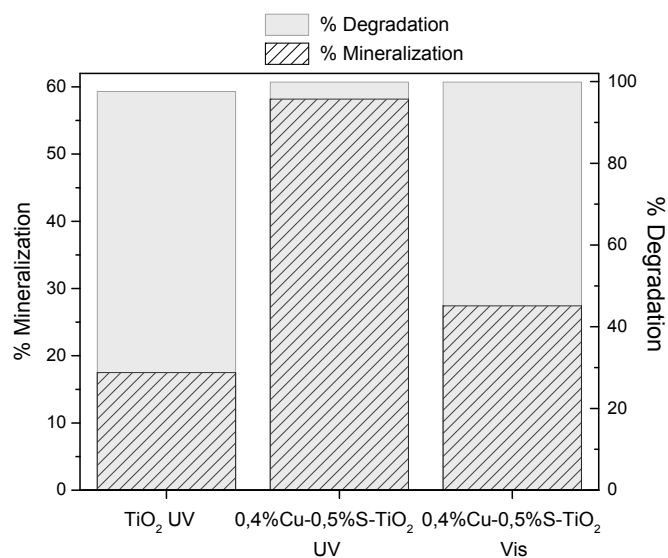


Fig. S8. Mineralization and degradation percentages upon 2 h under UV or visible light irradiation.

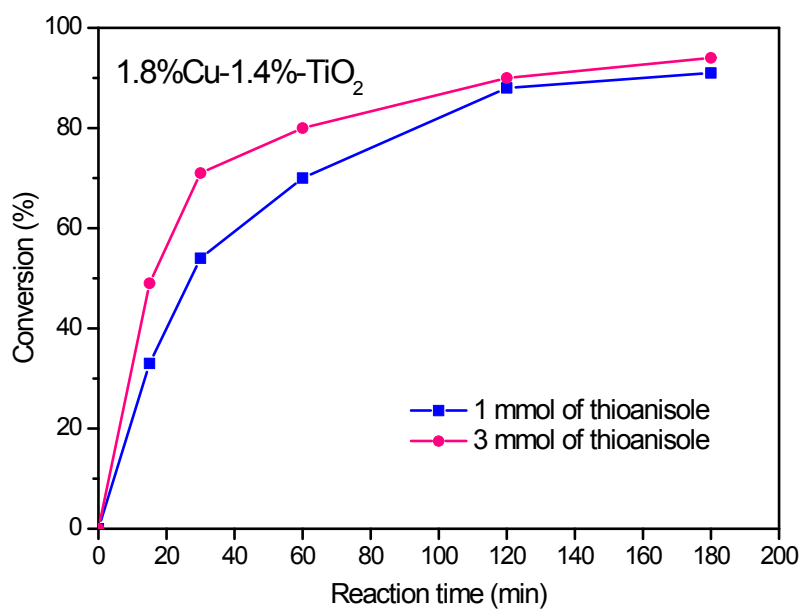


Fig. S9. Conversion of thioanisole versus reaction time using 1.8%Cu-1.4%S-TiO₂ catalyst.

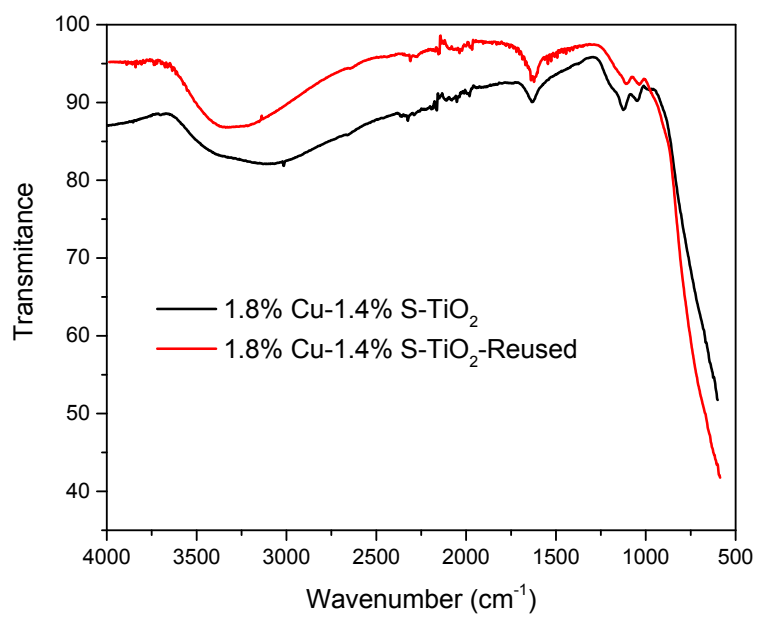


Fig. S10. FTIR spectra of 1.8% Cu-1.4% S-TiO₂ sample before and after oxidation reaction.