

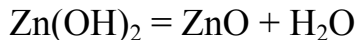
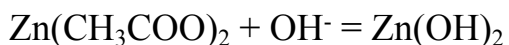
Electronic Supplementary Information (ESI)

A type-II semiconductor (ZnO/CuS Heterostructure) for visible light photocatalysis

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Mechanism:

For the synthesis of ZnO nanotubes Zn(II)- acetate has been used as precursor of ZnO and pyridine has been used as hydrolyzing agent. In the reaction condition pyridine hydrolyses to give OH⁻ ions and Zn(II)-acetate hydrolyses to give intermediate Zn(OH)₂. Finally dehydration of Zn(OH)₂ molecules gives rise ZnO.



The as-synthesized ZnO has been applied as seed in the synthesis of ZnO/CuO heterostructure. Synthesis of ZnO in alkaline medium induces negative charges on the ZnO surface. When Cu²⁺ is immobilized on the surface of ZnO, Cu²⁺ remains on the surface of ZnO nanotube due to the electrostatic interaction with hydroxyl ions which makes normally white ZnO turn blue. Alkali treatment leads to the formation of Cu(OH)₂ on the surface of ZnO and is finally converted to CuO. This ZnO/CuO heterostructure is converted to ZnO/CuS in presence of thioacetamide. Thioacetamide hydrolyses to give free S²⁻ ion in solution, which reacts with ZnO/CuO to give ZnO/CuS heterostructures.

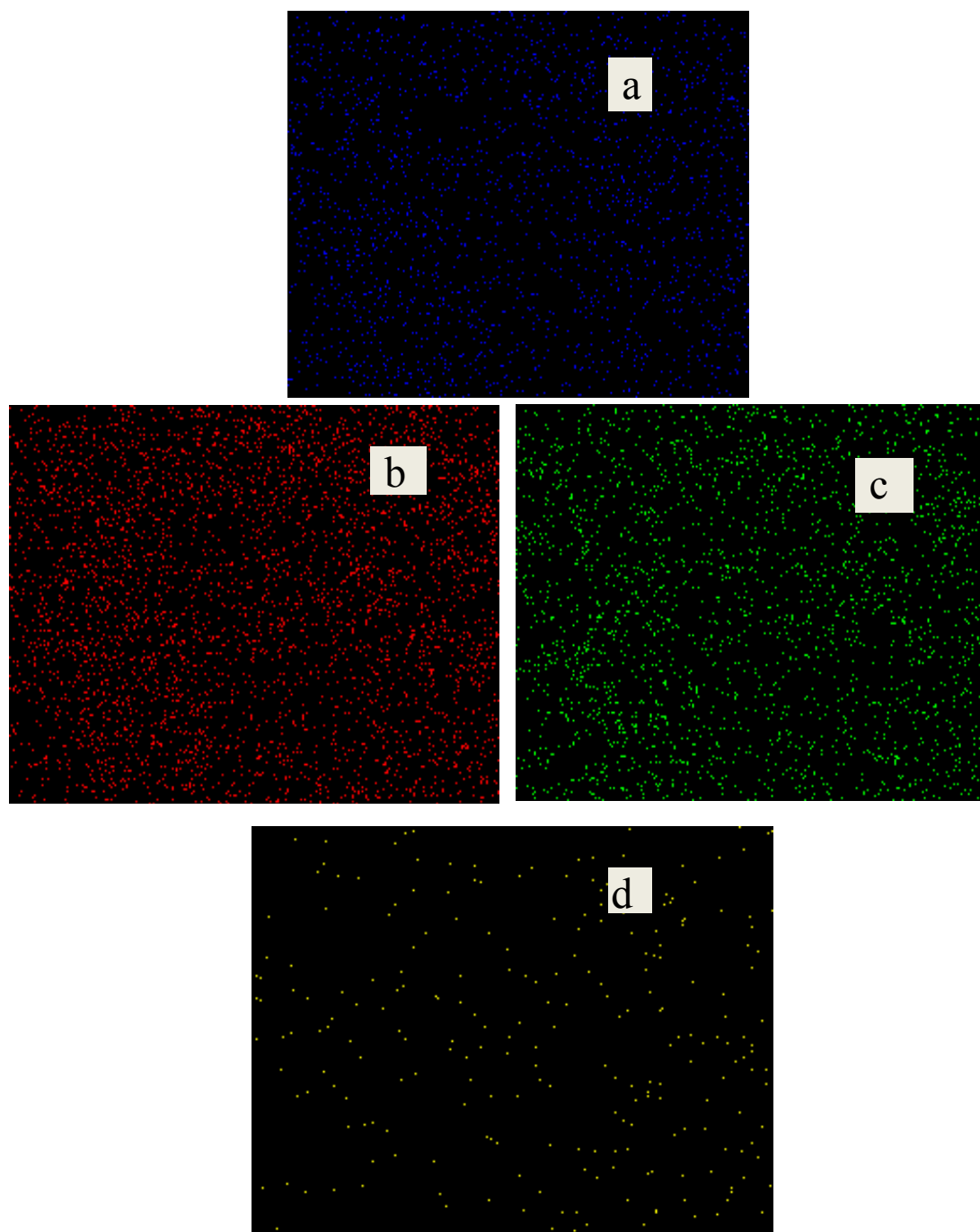


Fig. S1. EDS mapping of ZnO/CuS sample showing the homogeneous distribution of (a) Zn, (b) O, (c) Cu, (d) S.

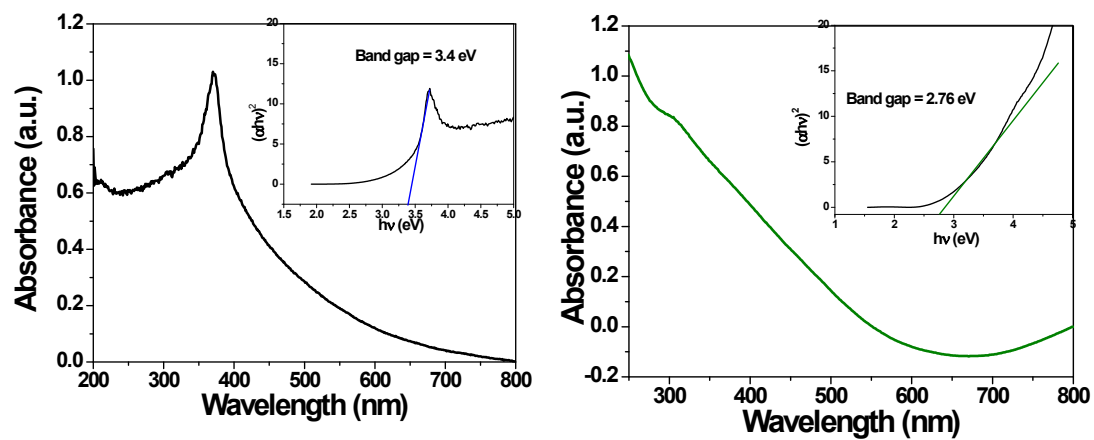


Fig. S2. UV-visible spectra of (a) bare ZnO, (b) bare CuS and the inset data showing the band gap values of both the materials.

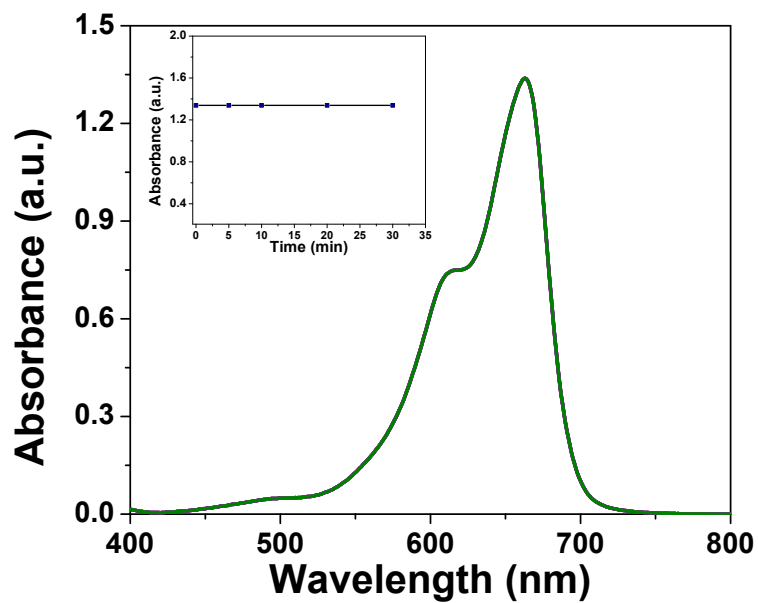


Fig. S3. UV-visible spectra of Methylene blue under irradiation of visible light up to 30 min and the inset data shows that plot of absorbance vs time.