Electronic Supplementary Material (ESI) for RSC Advances.

Quaternary semiconductor Cu_2ZnSnS_4 loaded with MoS_2 as co-catalyst for enhanced photo-catalytic activity

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Supporting Information

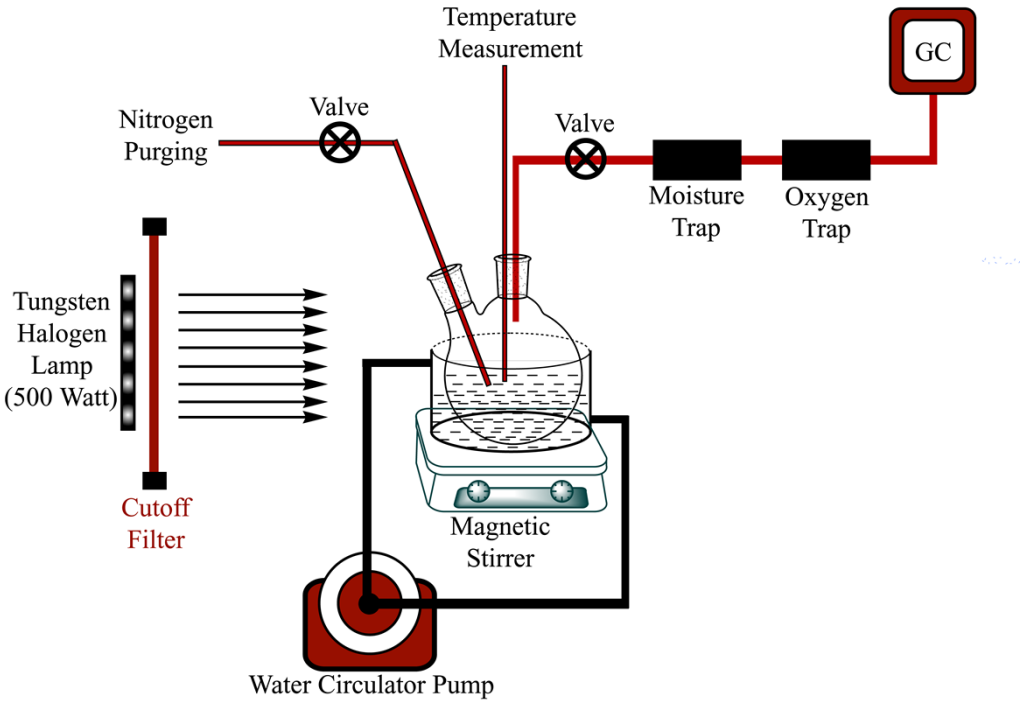

Figure S1: Schematic demonstration of photo-catalytic hydrogen generation by water oxidation.

Figure S1 shows the schematic diagram of photo-catalytic hydrogen generation setup. The dispersion of photo-catalyst in sacrificial agent solution is taken in a 100ml borosilicate round bottom flask equipped with water circulation jacket to maintain ambient temperature. A 500Watt Tungsten halogen lamp is placed at a certain distance (15cm) with a cut-off filter in between lamp and reaction flask. The gas produced in the flask is passed through moisture and oxygen trap followed by analysis in Gas chromatograph using a thermal conductivity detector.

Figure S2: Setup for dye degradation

Figure S2 shows the photo-catalytic reactor used in the present study. The set-up includes an immersion well photochemical reactor. The double-walled immersion well permits water circulation and it houses a MVL2 125W low pressure mercury vapour lamp as the light source to initiate the photo-catalytic reaction. In a typical photo-catalytic degradation experiment, 100 mL of aqueous Rhodamine-B dye (RhB) (10^{-5}M) and 0.05 g of the photo-catalyst sample were loaded into the reactor. The reaction mixture was stirred overnight in the dark at room temperature in order to achieve adsorption–desorption equilibrium among the photo-catalyst, dye, dissolved oxygen and atmospheric oxygen. During irradiation, the suspension was kept stirring in order to achieve a homogeneous solution. 2 mL of the sample was collected from the photo-reactor every ten minutes up to 1 hour. UV-Vis absorption spectra of the collected samples were recorded over the range 200–800nm after removing the solid catalyst particles by centrifugation. The concentration of the aqueous RhB was determined from the absorbance value monitored at 552 nm.

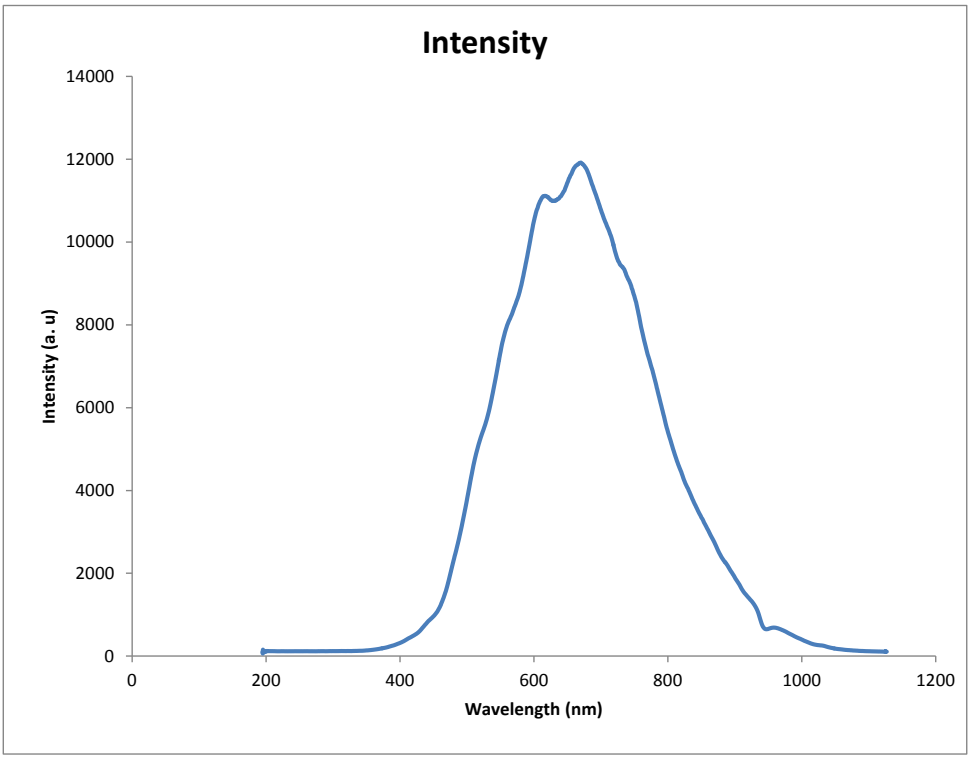

Figure S4: The power spectrum distribution for the 500W tungsten halogen lamp