

Electronic Supplementary Information

I) Experimental Setup for Measurements of Photo responsive Properties of Bi_2S_3 Nanostructures

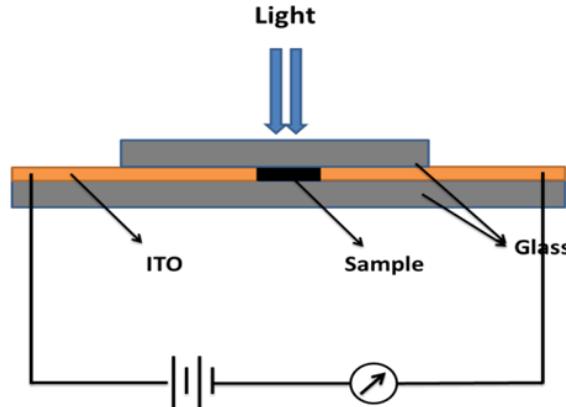


Figure SI 1 Experimental Setup for Measurements of Photo responsive Properties of Bi_2S_3 Nanostructures

II) Experimental Setup for measurements of hydrogen production



Figure SI 2 Experimental Setup for Measurements of measurements of hydrogen production from H_2S under sunlight

III) Table of comparative study of H_2 generation

Photocatalyst	Amount of H_2 generation [$\text{mmolhr}^{-1}\text{g}^{-1}$]	Reference no in manuscript
CdS	5.89	5
$\text{Cd}_{0.9}\text{Zn}_{0.1}\text{S}$	8.32	10(d)
CdIn_2S_4	6.96	10(e)
CdIn_2S_4	6.476	6
CdLa_2S_4	5.104	10(b)
ZnS	2.050	10(c)
ZnIn_2S_4	10.574	10 (a)
Bi_2S_3	8.880	Present work

IV) Gas chromatographic study for hydrogen detection



Figure SI 3 gas chromatograph for hydrogen (A) for H_2S (B) for H_2O

V) XRD of nanostructured Bi_2S_3 after photocatalysis.

Figure SI 3 (RS1-RS3) shows the XRD pattern for sample S1, S2 and S3 taken after photocatalytic hydrogen generation. Figure shows orthorhombic crystal structure and it is consistent with XRD pattern taken before photocatalytic hydrogen generation. Figure SI 3 and Figure 1 in revised manuscript reveals that there is no structural change in Bi_2S_3 before and after photocatalysis.

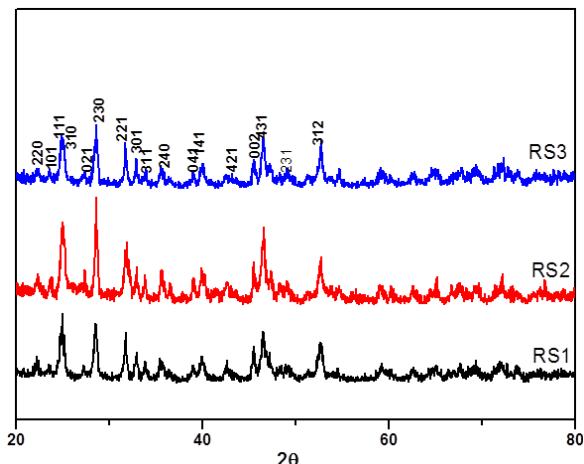


Figure SI 3 XRD pattern of Nanocrystalline Bi_2S_3 samples RS1, RS2 and RS3 after photocatalysis

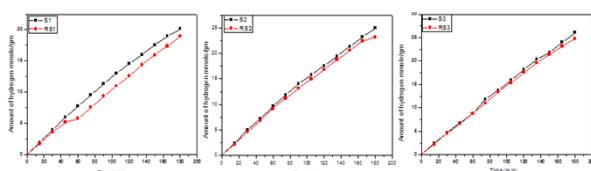


Figure SI 4 Hydrogen evolution of Nanocrystalline Bi_2S_3 samples (S1, S2, S3) and (RS1, RS2, RS3) reused catalyst respectively.

VI) Hydrogen evolution of reused Bi_2S_3 samples

The reproducibility of the photocatalyst has also been examined by reusing the photocatalyst sample (S1, S2 and S3). Figure SI 4 shows the hydrogen evolution of nanocrystalline Bi_2S_3 samples (S1, S2, S3) and (RS1, RS2, RS3) reused catalyst, respectively.