Electronic Supplementary Information

Non-stoichiometric SnS Microspheres with Highly Enhanced Photoreduction Efficiency for Cr(VI) Ions

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Crystallite size

Crystallite size was calculated for (111) fcc of SnS from scherrer equation for all three samples, un-doped SnS and doped SnS.

$$L = K\lambda / (\beta \cos\theta)$$

K is dimensionless factor, usually 0.94, λ is wavelength of x-rays i.e. 1.54 Å, β is full width half maximum (FWHM), θ is the Bragg's angle and L is the crystallite size.

Table S1 Crystallite size obtained from Sherrer equation

Samples	Crystallite size (nm)
1:1 SnS	12.7
1.1:1 SnS	11.7
1.2:1 SnS	11.8

XPS

Comparative Sn 3d XPS clearly shows a shift towards binding energy

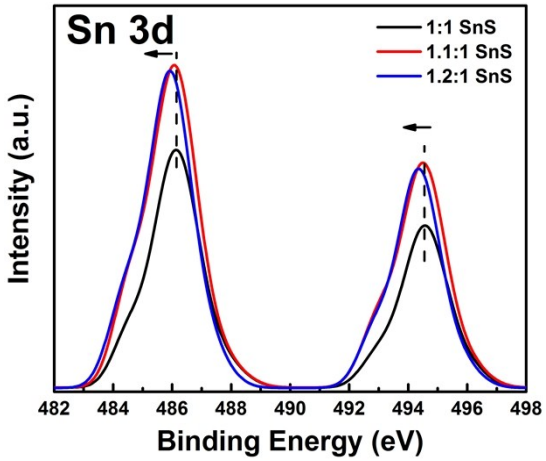

Fig. S1 Core level Sn 3d spectra all samples.

BET surface area

Nitrogen adsorption-desorption isotherm was performed to determine BET surface area of the samples. SnS samples showed isotherm type IV with type H_3 desorption hysteresis loop. Depending upon the crystalline size of doped metal, doping in general effects the final surface area. This is confirmed in our results mentioned in table. The surface area of doped SnS has increased in comparison to un-doped SnS i.e. 1:1 SnS [1].

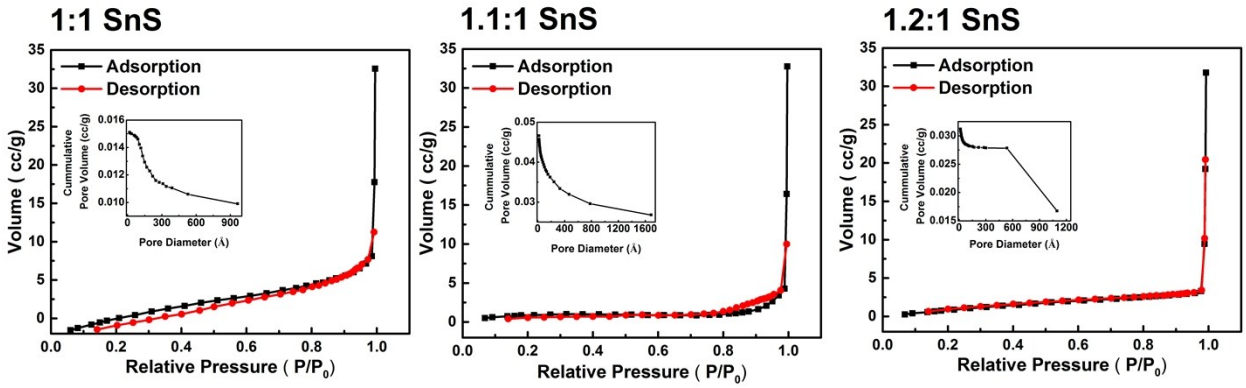

Fig. S2 N_2 adsorption-desorption isotherm of all samples.

Table S2 Parameters Obtained from N_2 Desorption Isotherm

Samples	BET surface area (m^2/g)	average pore diameter (nm)
1:1 SnS	4.81	70
1.1:1 SnS	6.73	77
1.2:1 SnS	7.72	75

Photocatalytic Reduction of Cr(VI) to Cr(III)

Fig. S3 Cr(VI) reduction to Cr(III) at 30 min after illumination using 1.1:1 SnS (with doped condition).

Determination of Optimal Doping Concentration of SnS

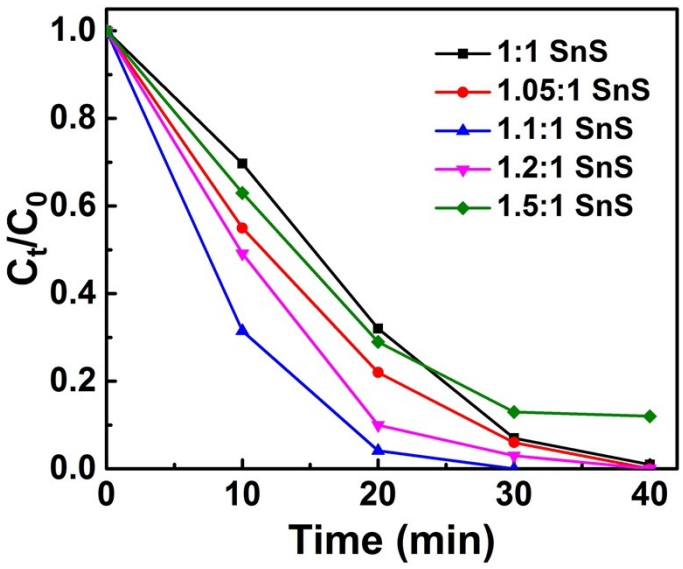

Fig. S4 Cr(VI) reduction to Cr(III) using different doping concentrations.

Evaluation of Photocatalytic Activity Using Highly Concentrated Cr(VI) Ion (50 ppm)

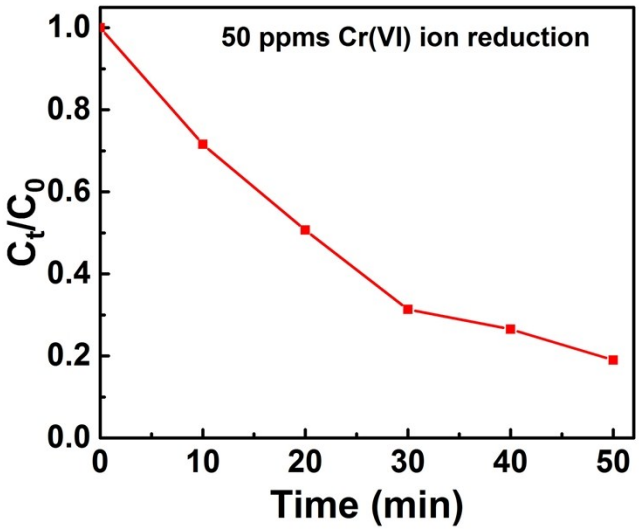

Fig. S5 Cr(VI) reduction to Cr(III) for high concentration solution (50 ppm).

References

1. Feng, H.; Zhang, M.-H.; Yu, L. E. Hydrothermal synthesis and photocatalytic performance of metal-ions doped TiO_2. *Applied Catalysis A: General* **2012**, *413-414*, 238–244.