Electronic Supporting Information

Three-Dimensional Porous CoSnS@CNT Nanoarchitecture as Highly Efficient Bifunctional Catalyst for Boosted OER Performance and Photocatalytic Degradation

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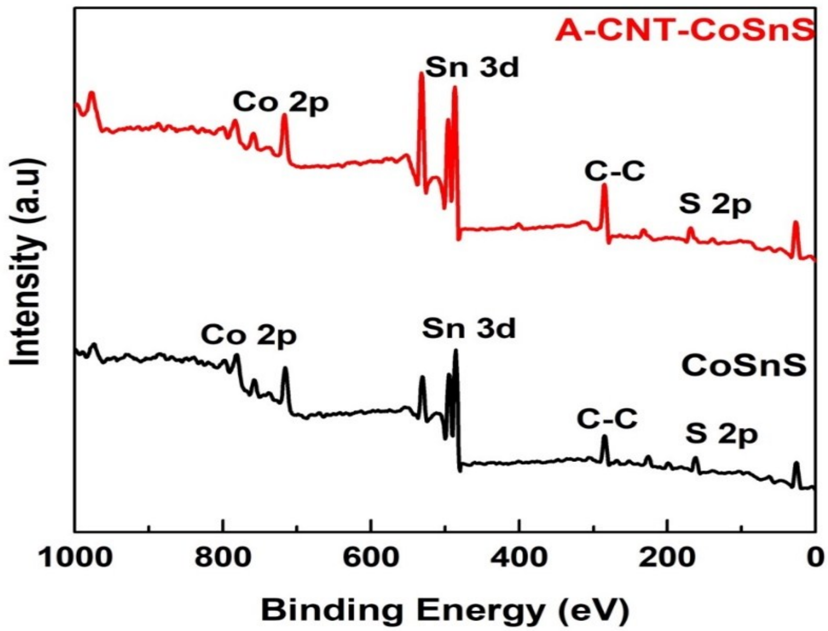

Fig. S1. XPS survey spectra of CoSnS and A-CNT-CoSnS

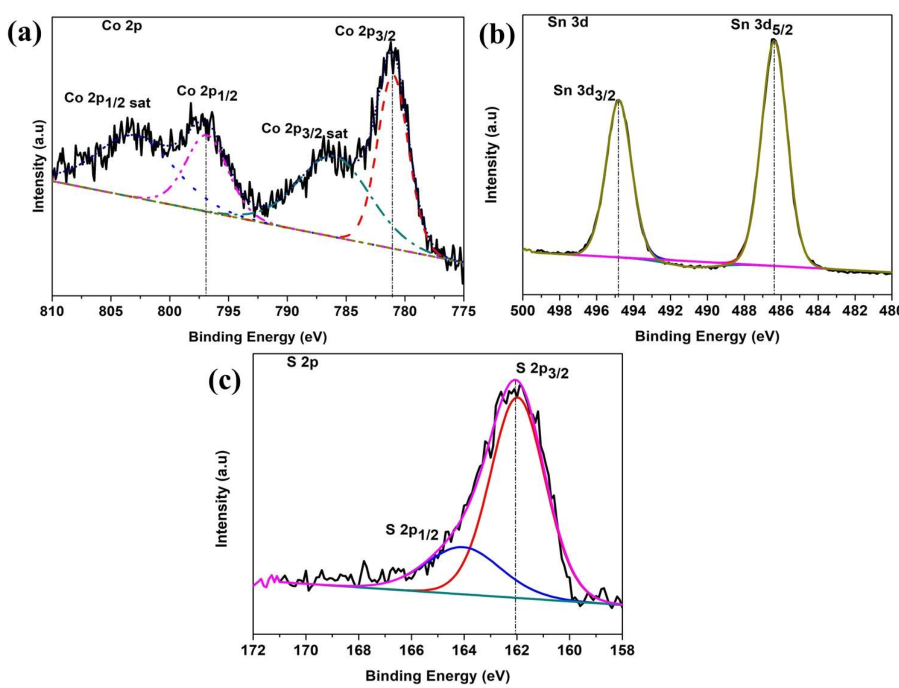

Fig.S2. XPS core level spectra CoSnS (a) Co 2p (b) Sn 3d (c) S 2p

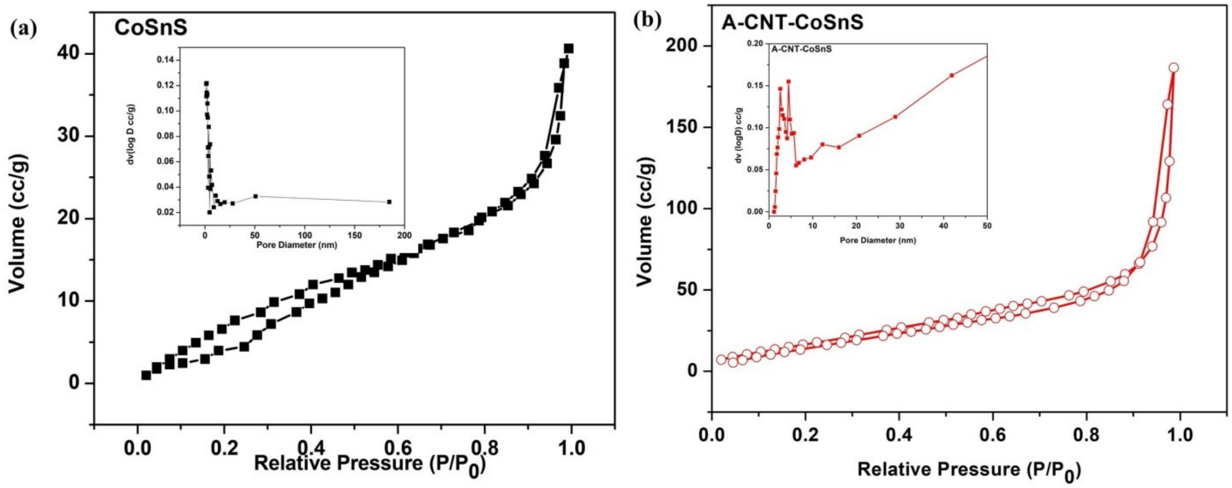

Fig.S3. BET surface area (a) CoSnS and (b)A-CNT-CoSnS (inset) pore size distribution

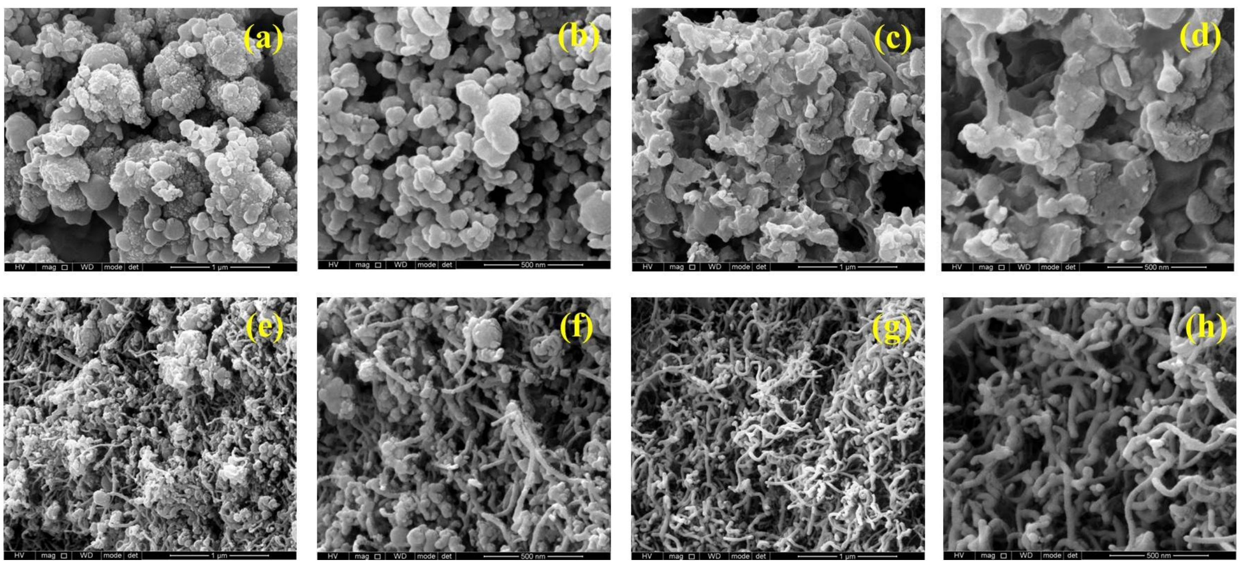

Fig.S4. SEM images (a-b) CoSnS (c-d) A-CoSnS (e-f) CNT-CoSns (g-h) A-CNT-CoSnS

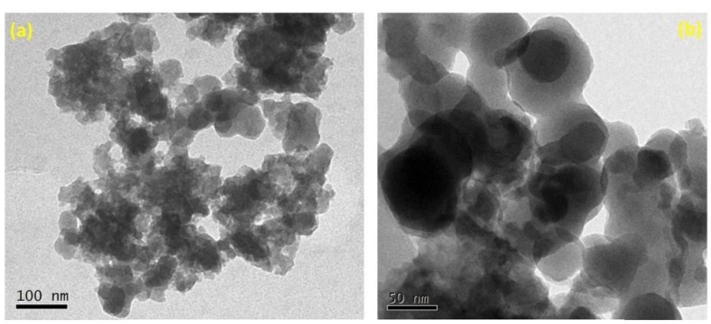

Fig.S5. TEM images (a-b) CoSnS

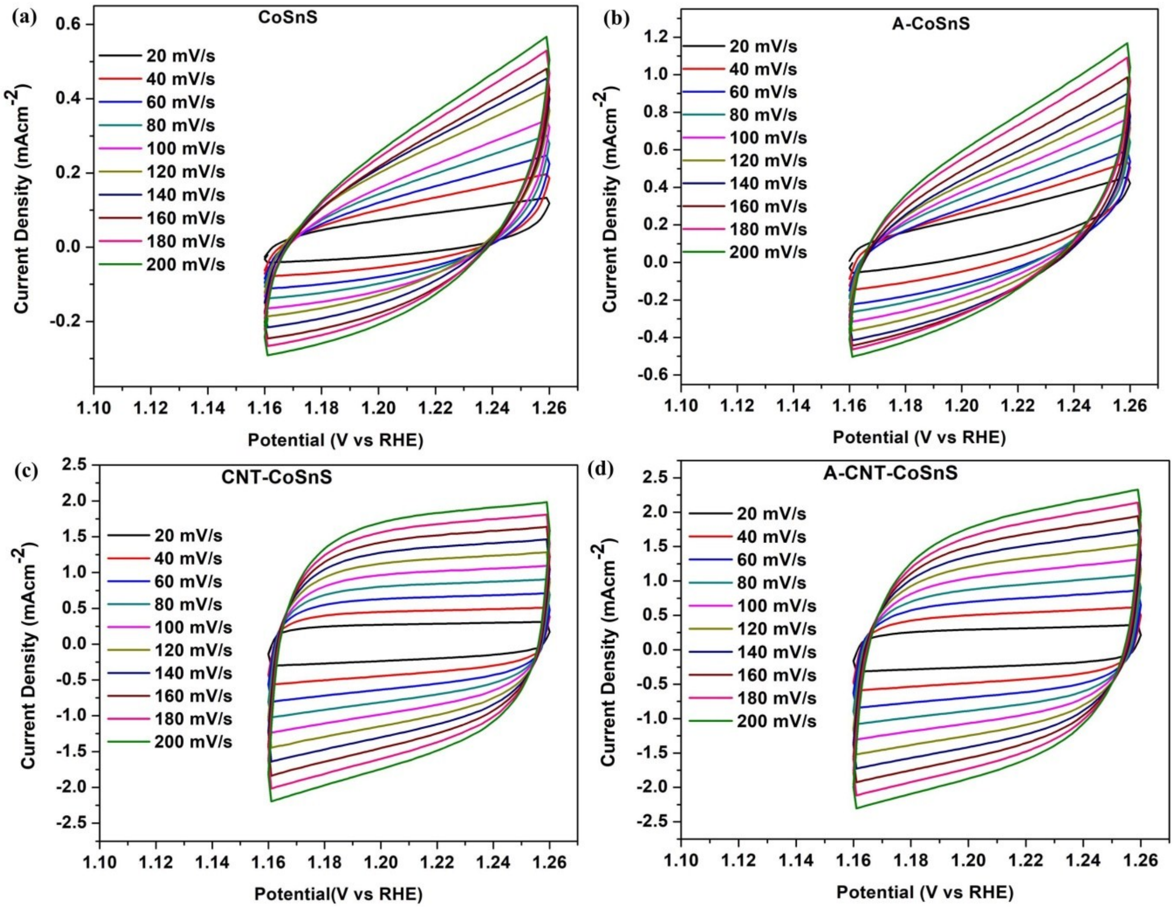

Fig. S6 (a) Estimated C_{dl} for the catalysts in 1 M KOH. (a) CoSnS b) A-CoSnS (c) CNT-CoSnS and (d) A-CNT-CoSnS

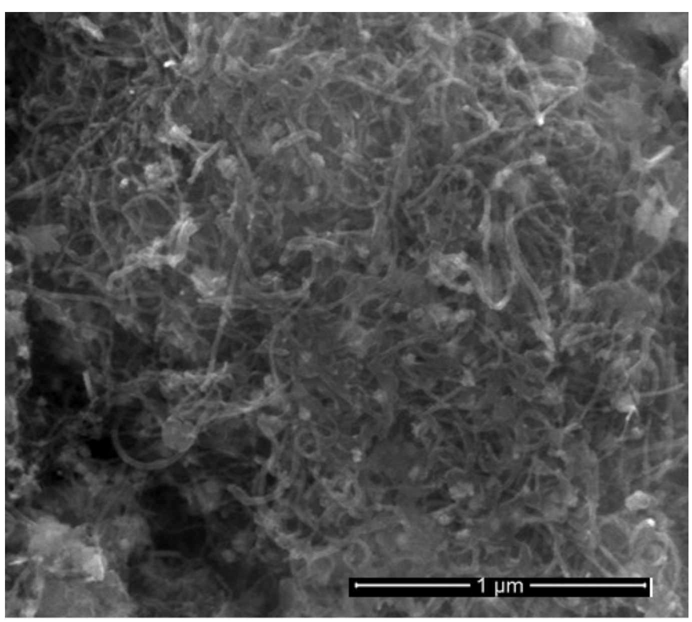

Fig. S7. SEM images of A-CNT-CoSnS after the durability test

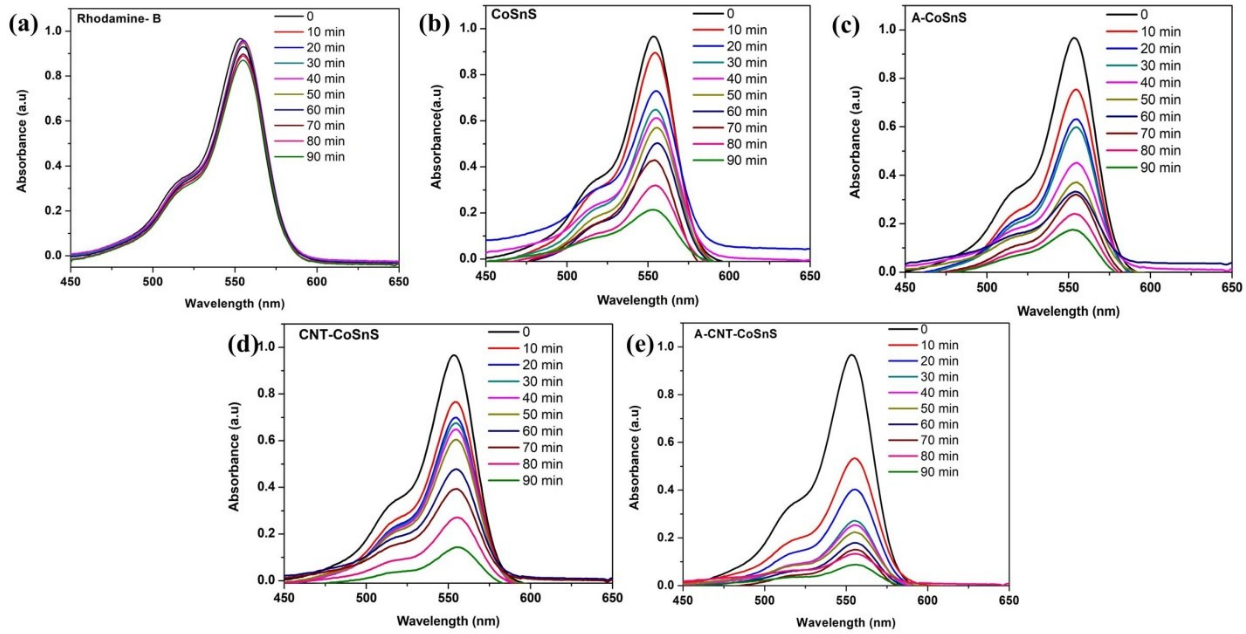

Fig. S8 . UV-Visible spectra for Rhodamine B degradation (a) Without catalyst (b) CoSnS (c) A-CoSnS (d) CNT-CoSnS and (e) A-CNT-CoSnS

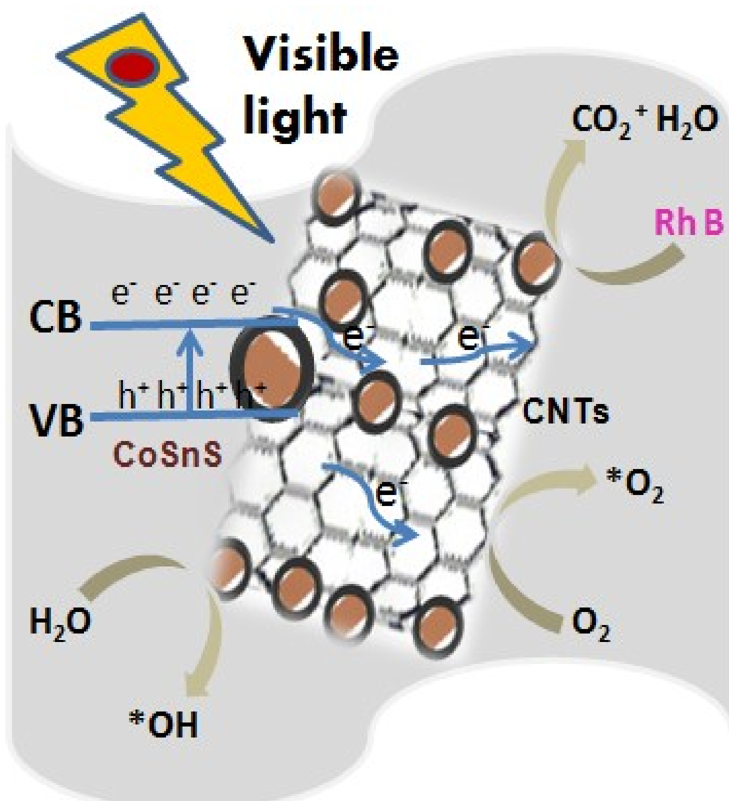

Fig. S9. The proposed mechanism for photocatalytic degradation of RhB

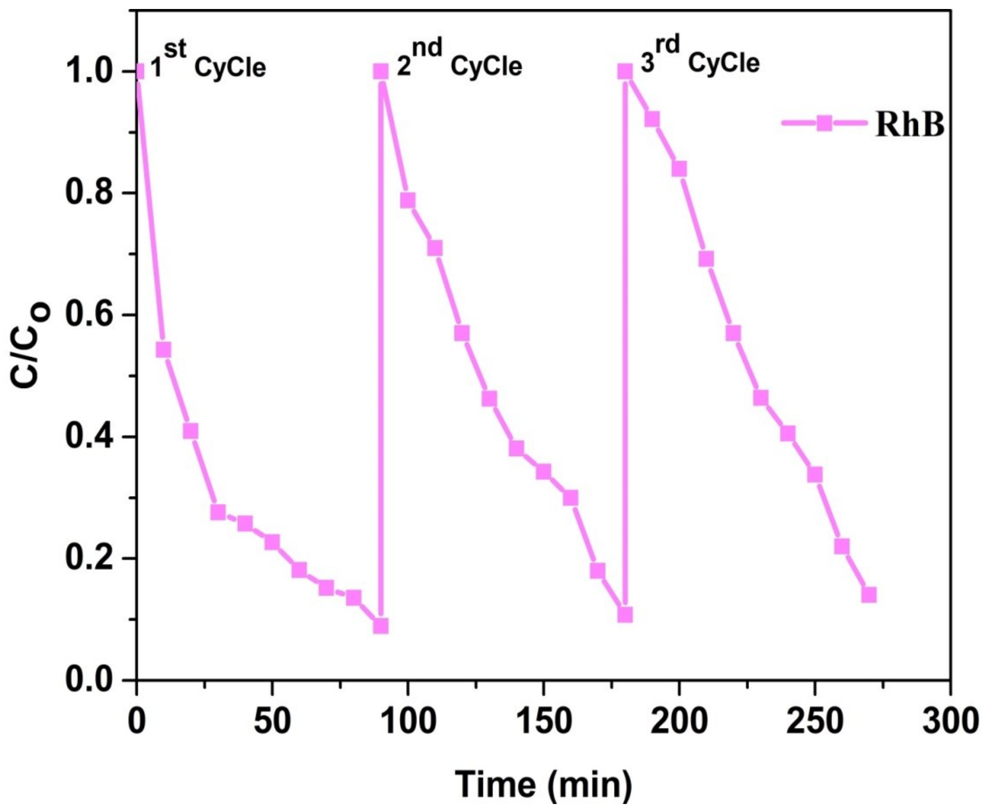

Fig. S10 .Recyclability analysis of A-CNT-CoSnS for RhB dye degradation in each 90 min

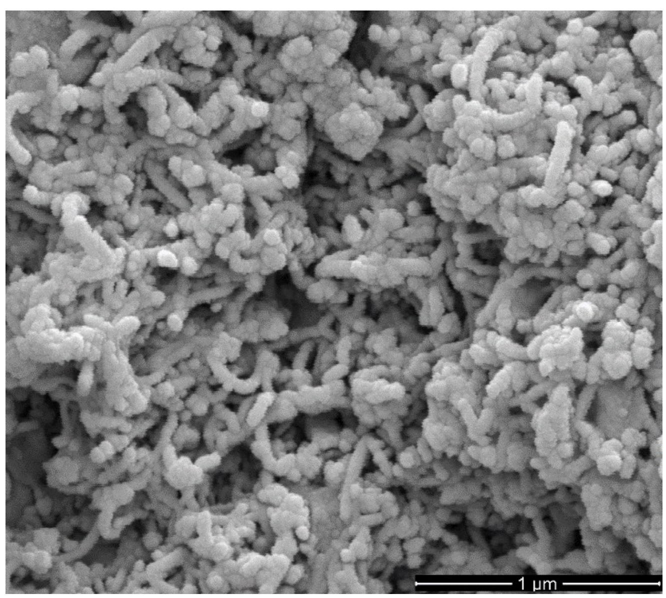

Fig. S11. SEM images of A-CNT-CoSnS after RhB dye degradation

Table 1 Summary of BET analysis

Materials	**Surface Area (m^2/g)**	**Pore Volume (cc/g)**	**Pore Diameter (nm)**
CoSnS	**40.84**	**0.0694**	**6.80**
A-CNT-CoSnS	**76.21**	**0.2885**	**15.14**

Table 2 Summarized LSV, Tafel slope value, C_{dl} and EIS of samples

Materials	**η @ 10 mA/cm^2**	**Tafel (mV/dec)**	**ECSA (mF cm^{-2})**	**EIS (Ω)**
CoSnS	420 mV	118	1.18	416.68
A-CoSnS	400 mV	113	2.22	194.86
CNT-CoSnS	350 mV	75	8.57	36.98
A-CNT-CoSnS	330 mV	73	9.26	24.18