Electronic Supplementary Information

Alkylammonium thiostannate inorganic/organic hybrids as high-performance photocatalysts with a decoupled adsorption-photodegradation mechanism

*Xiufang Hao,[a] Xiaoyan Cui [a], Meiqi Hu [a], Yiming Jia [a], Xinxin Li [b], Shuo Wei *[a] and Jun Lu [c]*

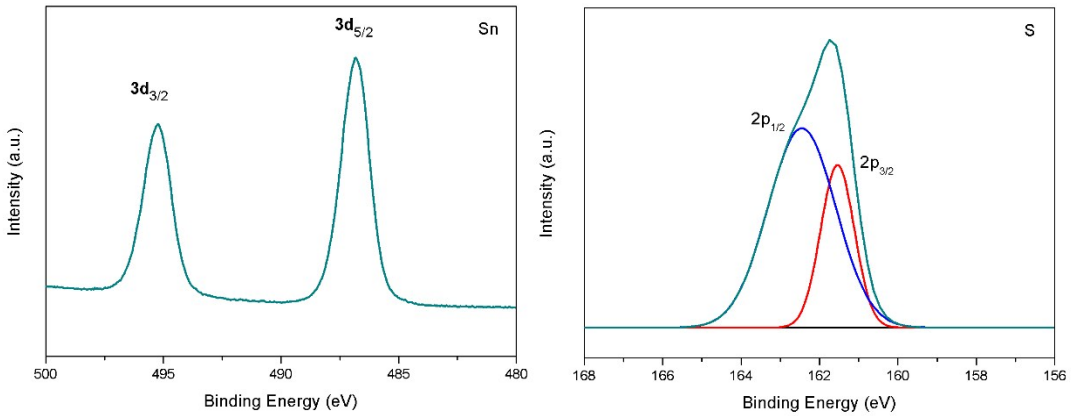
Table S1. The full elements analyses of three compounds

	H	C	N	Sn
$(C_4H_9NH_3)_2Sn_3S_7$	12.90 (13.18)	3.77 (3.84)*	3.276 (3.332)	48.38 (48.64)
$(C_6H_{13}NH_3)_2Sn_3S_7$	19.47 (18.35)	3.61 (3.57)	4.490 (4.08)	44.86 (45.26)
$(C_8H_{17}NH_3)_2Sn_3S_7$	20.94 (22.84)	2.91 (3.33)	4.599 (4.76)	41.91 (42.24)

*The data in the bracket was the calcultated value from the formula $A_2Sn_3S_7$

Table S2 Binding Energies (in eV) of the Main Core Level Spectrum for the $A_2Sn_3S_7$

	S2p		Sn3d	
	$2p_{1/2}$	$2p_{3/2}$	$3d_{3/2}$	$3d_{5/2}$
$(baH)_2Sn_3S_7$	162.55	161.54	495.32	486.82
$(haH)_2Sn_3S_7$	162.54	161.59	495.32	486.82
$(oaH)_2Sn_3S_7$	162.57	161.57	495.32	486.87



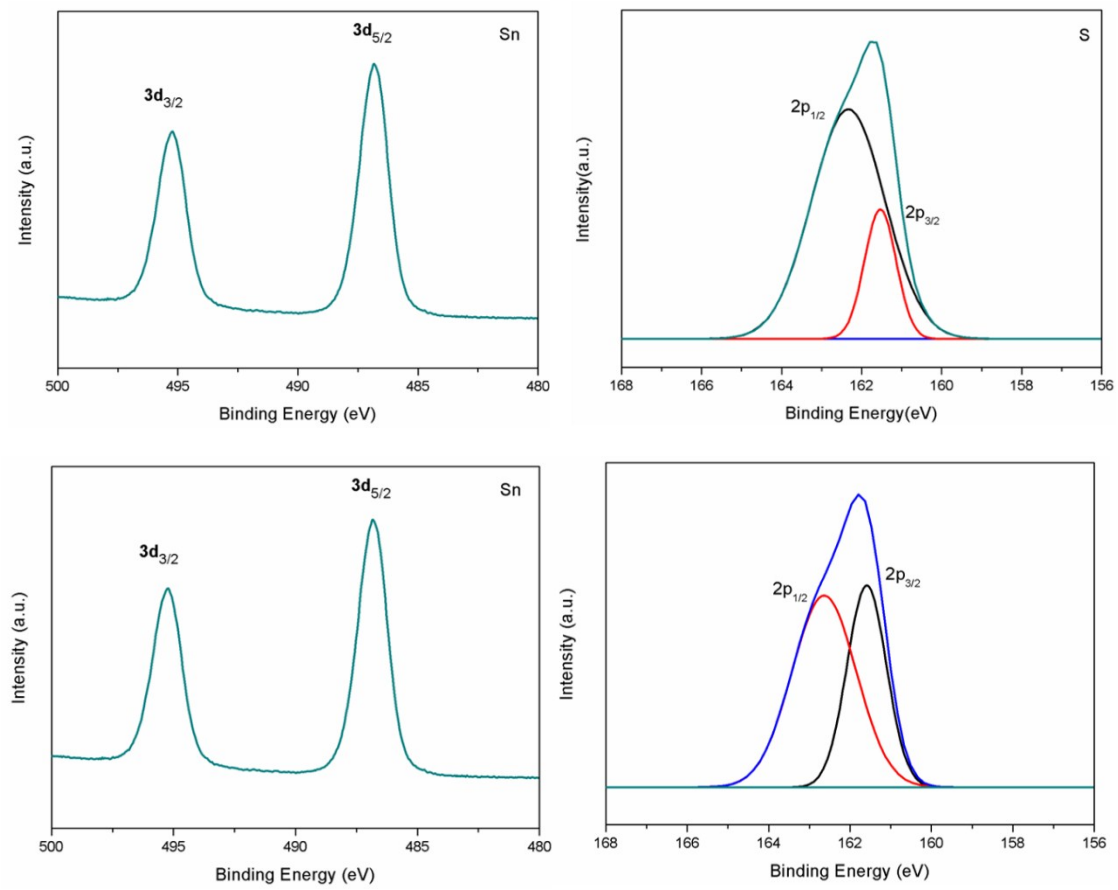


Figure.S1 The Sn and S XPS spectra of $A_2Sn_3S_7$, A was baH, haH, and oaH, respectively from top to bottom.

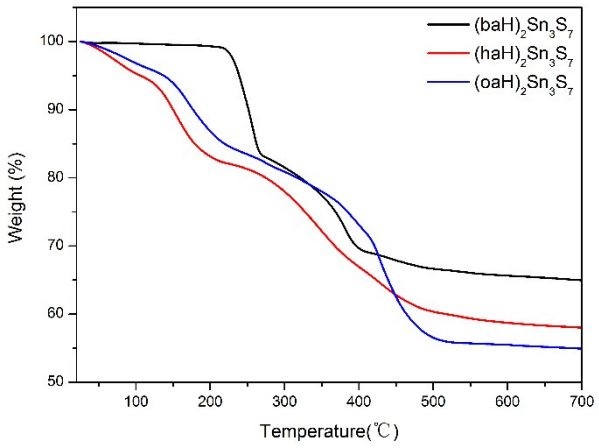


Figure.S2 Thermogravimetric curves for $A_2Sn_3S_7$

Table S3. Comparison of the adsorption capacities on various adsorbents for RhB.

Adsorbent	Capacity(mg/g)	Ref.
$(baH)_2Sn_3S_7$	1305	This work
$(oaH)_2Sn_3S_7$	1149	This work
$(haH)_2Sn_3S_7$	1047	This work
HP-TPPO-3	828.6	Ref[33]
In-MOF@GO-2	267	Ref[34]
Au-CN_X	250	Ref[35]
SnS_2	200.0	Ref[36]
HSA	185.61	Ref[37]
$W_{18}O_{49}$ nanowire	120	Ref[38]
SnS_2/rGO	94.07	Ref[39]
MoS_2	49.2	Ref[40]

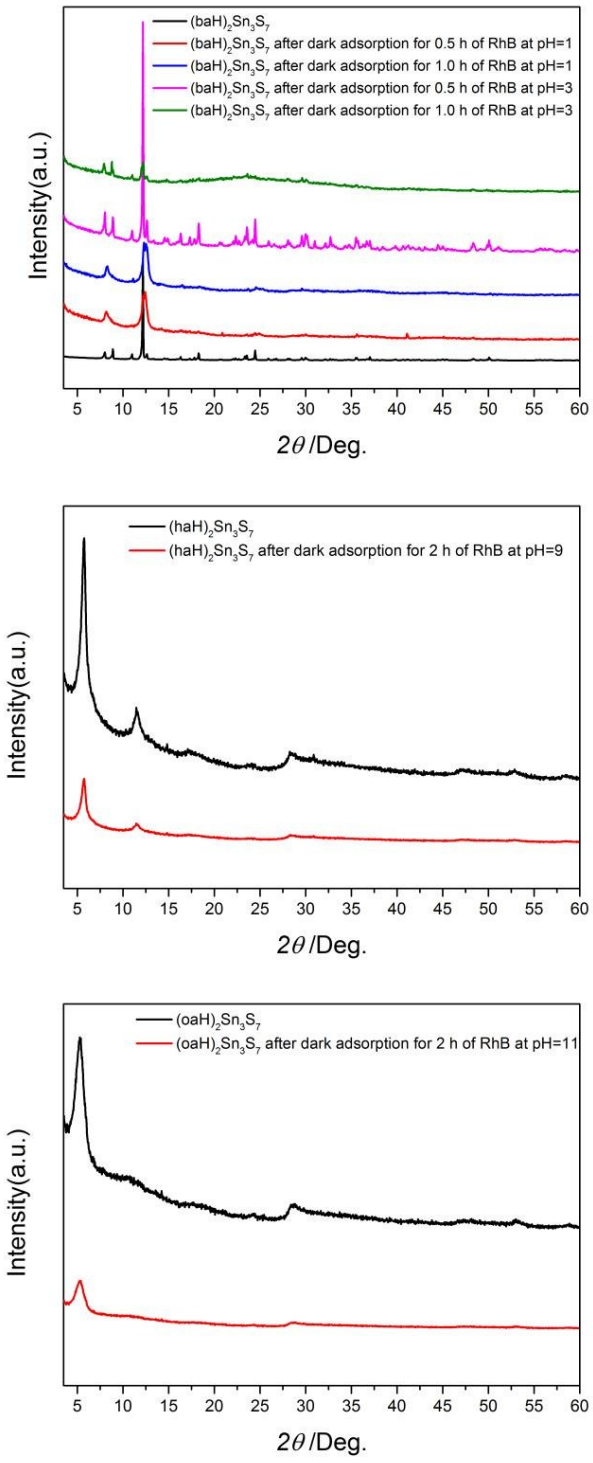


Figure.S3 The PXRD of $A_2Sn_3S_7$ in solution with different pH at a specific time.

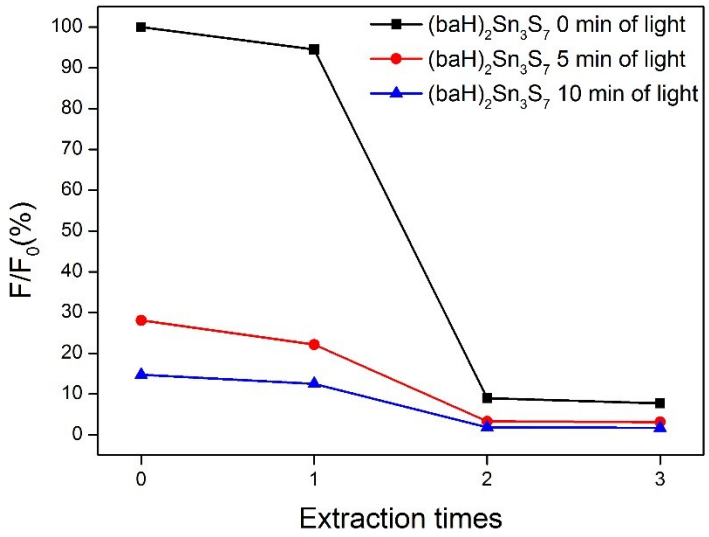


Figure.S4 The Fluorescence intensity of undegraded RhB in photocatalytic process with multiple dispersive liquid-liquid microextraction for three extraction cycles

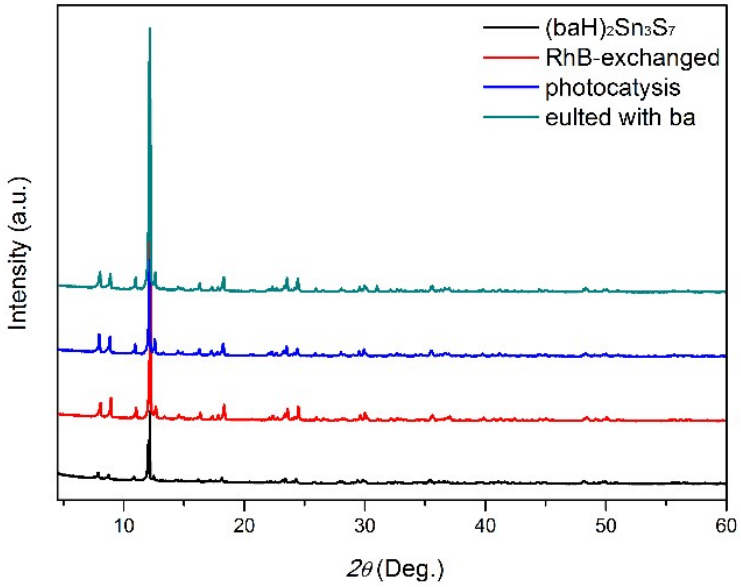


Figure.S5 PXRD of $(baH)_2Sn_3S_7$ catalyst in cycle process.

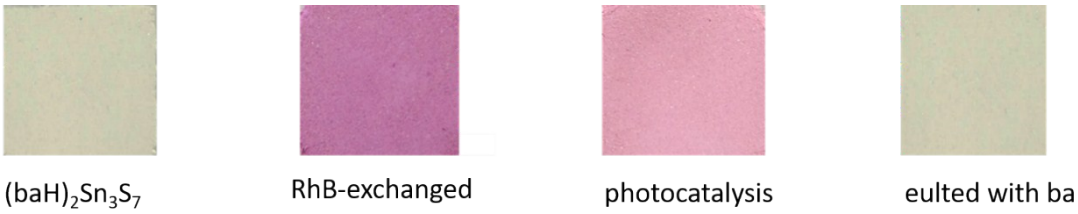


Figure.S6 The colored photos of $(baH)_2Sn_3S_7$ powder undergo ion-exchange, photocatalysis and elution in a cycle experiment

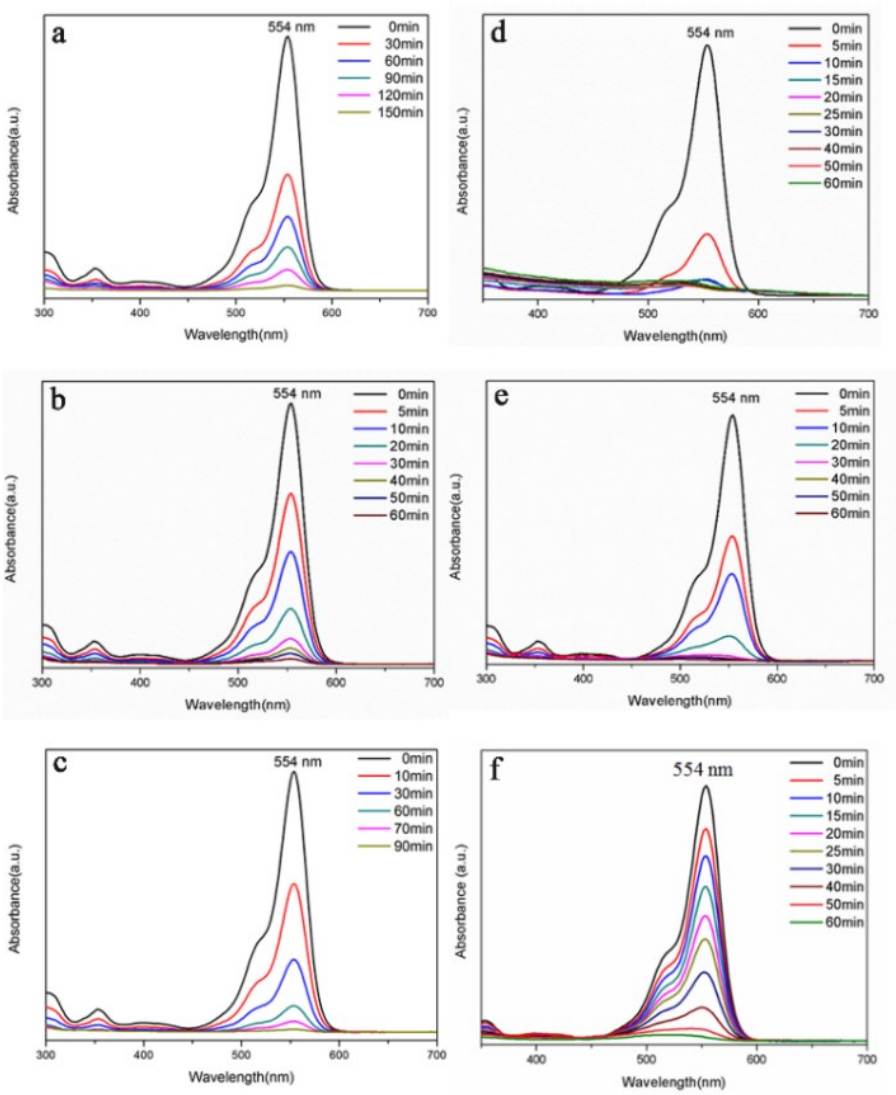


Figure.S7 UV-Vis absorption spectra of RhB in blank experiments without illumination (a) $(baH)_2Sn_3S_7$, (b) $(haH)_2Sn_3S_7$ and (c) $(oaH)_2Sn_3S_7$; The UV-Vis absorption spectra of RhB in integrated adsorption-photocatalysis experiments (d) $(baH)_2Sn_3S_7$, (e) $(haH)_2Sn_3S_7$ and (f) $(oaH)_2Sn_3S_7$.