Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Formation of hollow MoO_3/SnS_2 heterostructured nanotubes for efficient light-driven hydrogen peroxide production

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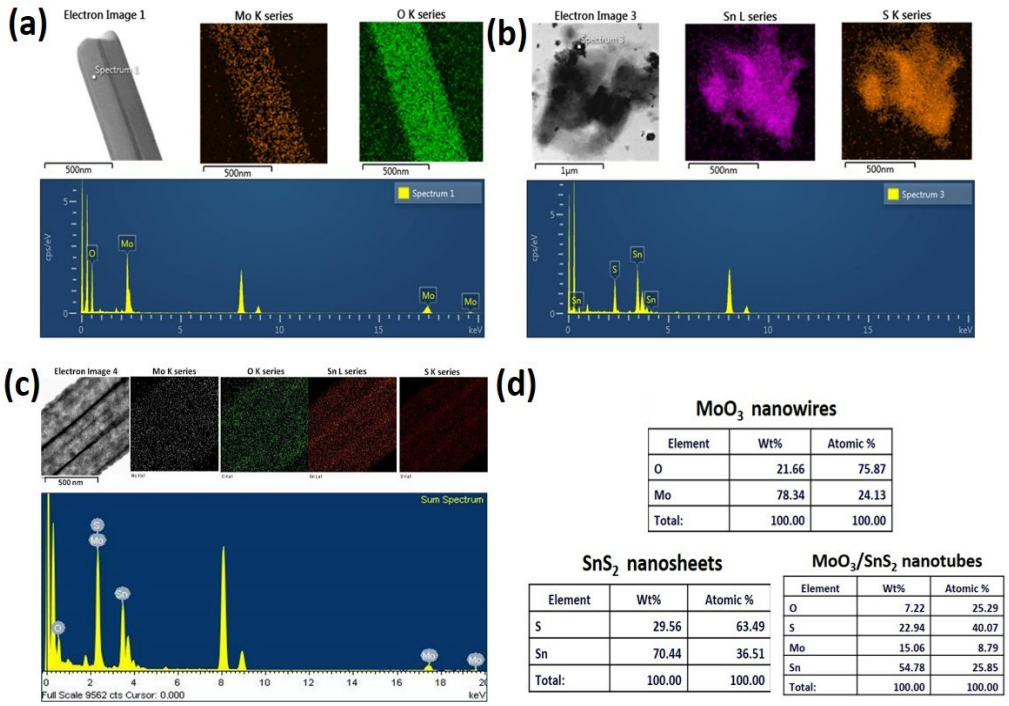

MoO_3 nanowires

Element	Wt%	Atomic %
O	21.66	75.87
Mo	78.34	24.13
Total:	100.00	100.00

SnS_2 nanosheets

Element	Wt%	Atomic %
S	29.56	63.49
Sn	70.44	36.51
Total:	100.00	100.00

MoO_3/SnS_2 nanotubes

Element	Wt%	Atomic %
O	7.22	25.29
S	22.94	40.07
Mo	15.06	8.79
Sn	54.78	25.85
Total:	100.00	100.00

Fig. S1. EDX spectrum of (a) MoO_3 nanowires; (b) SnS_2 nanosheets; (c) MoO_3/SnS_2 nanotubes; (d) element contents of as prepared samples.

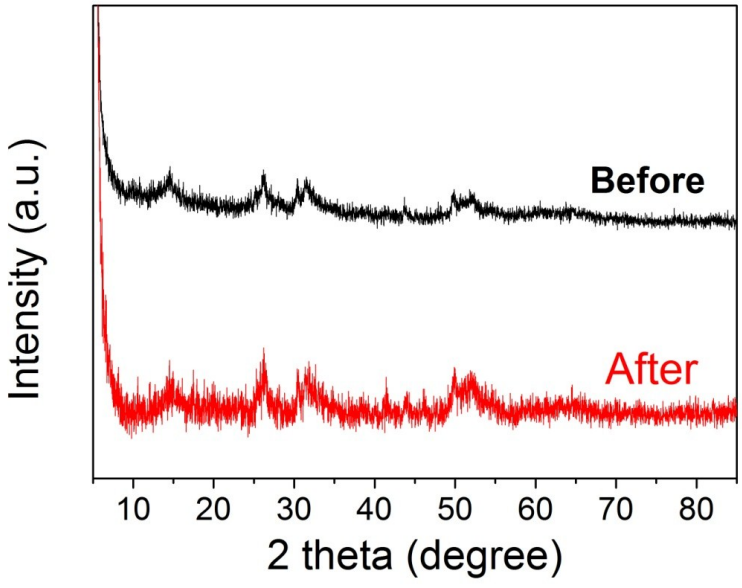

Fig. S2. XRD patters of SnS_2 nanosheets before and after cycling.

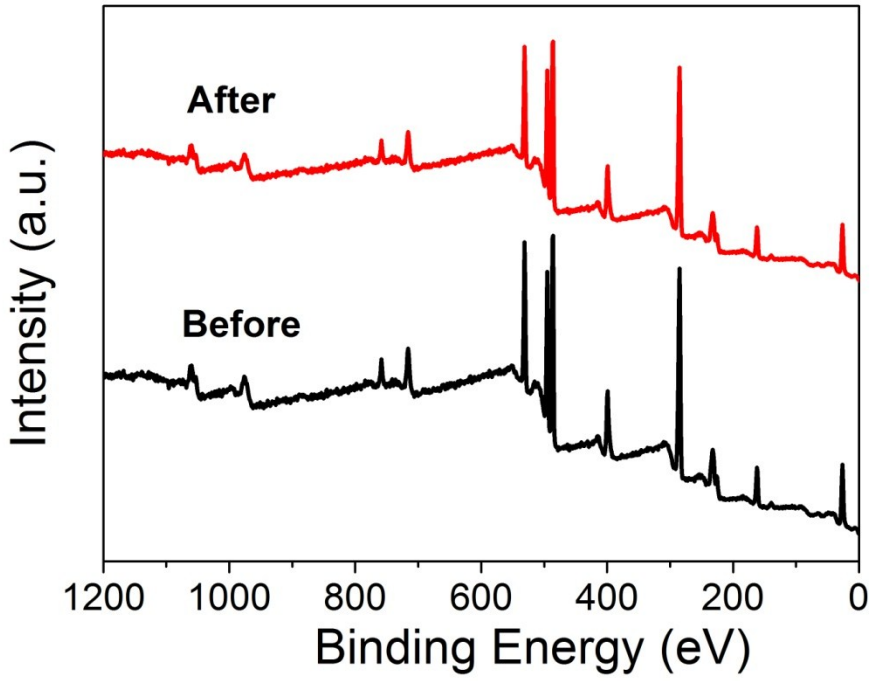

Fig. S3. XPS patters of MoO_3/SnS_2 nanotubes before and after cycling.

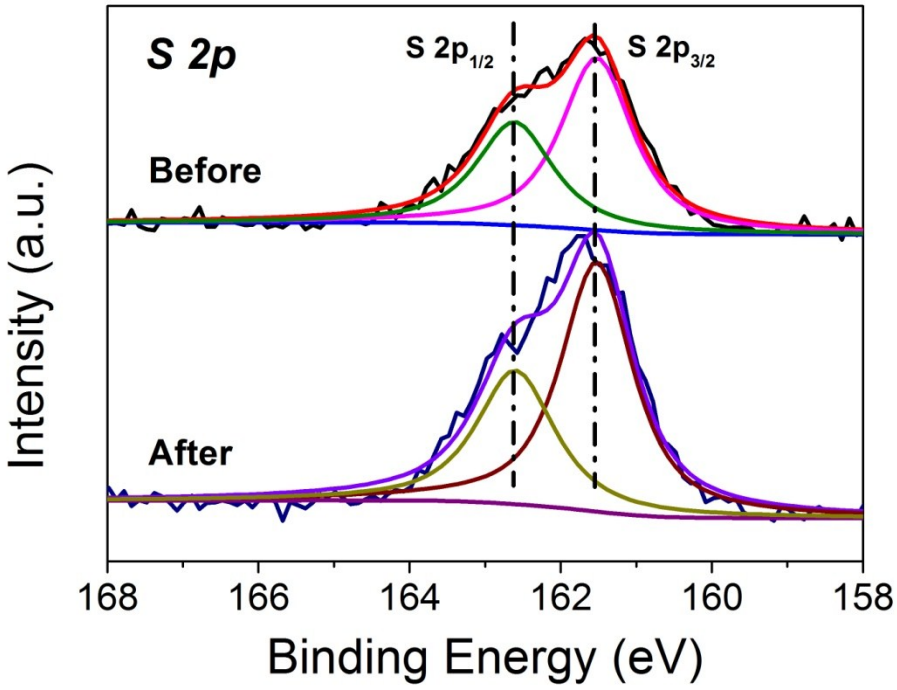

Fig. S4. S 2p patters of MoO_3/SnS_2 nanotubes before and after cycling.

Table S1. The comparation of photocatalytic H_2O_2 production activity among some reported photocatalysts in the literatures.

Catalysts/Weight (mg)	Light source	Time/min	H_2O_2 evolution rate (μmol h-1)	Ehancement factor vs. bulk	Ref.
Perylene imides/C_3N_4 /50	300 W Xe-lamp (λ>420 nm)	120	57.5	19.2	S1
CdS/graphene /50	300 W Xe-lamp (λ>420 nm)	720	4	6.1	S2
$Au_{0.2}/BiVO_4$ /50	2 KW Xe-lamp (λ>420 nm)	600	4.1	8.0	S3
CNT/C_3N_4 /100	300 W Xe-lamp (λ>400 nm)	30	54	10.8	S4
Biphenyl Diimide/C_3N_4 /50	Solar light simulator (λ>420 nm)	120	12.2	9.0	S5
Mellitic Triimide/C_3N_4 /50	300 W Xe-lamp (λ>420 nm)	120	16.8	Not Given	S6
RGO/TiO_2 /20	300 W Xe arc lamp (λ>320 nm)	180	27.2	15.7	S7
Polyoxometalate/ C_3N_4 /100	300 W Xe arc lamp (λ>320 nm)	60	35.4	12.4	S8
MoO_3/SnS_2 nanotubes /50	Solar light simulator	100	69.2	11.2	This work

H_2O_2

evolution in this work was compared with others in the reported literatures. To develop a better contrast, various photocatalysts were chosen for the H_2O_2 production comparison. Detailed information was also shown in **Table S1**. Zang et al. reported a Perylene imides modified C_3N_4 for H_2O_2 evolution, and the highest H_2O_2 evolution rate was 57.5 μmol h^{-1} **[1]**. The performance of CdS/graphene in H_2O_2 evolution was investigated by Lee et al., and the highest H_2O_2 evolution rate was 18.1 μmol h^{-1}, which was 6.1 times higher than that of bulk CdS **[2]**. The H_2O_2 evolution rates of them are all lower than that of MoO_3/SnS_2 nanotubes sample in this study. Other catalytic systems, such as $Au_{0.2}/BiVO_4$ **[3]**, CNT/C_3N_4 **[4]**, Biphenyl Diimide/C_3N_4 **[5]**, Mellitic Triimide/C_3N_4 **[6]**, RGO/TiO_2 **[7]**, and Polyoxometalate/C_3N_4 **[8]**, are also compared, and their H_2O_2 evolution rates are also lower than that of MoO_3/SnS_2 nanotubes sample. MoO_3/SnS_2 nanotubes sample showed a 69.2 μmol h^{-1} H_2O_2 evolution rate, which was 11.2 times higher than the bulk MoO_3 nanowires.

Table S2 Actual Sn content from ICP-OES analysis of the solution after four cycles of MoO_3/SnS_2 nanotubes.

Cycle	Actual Sn contents (wt.%)
1st	0
2nd	0
3rd	0
4th	0

References

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