Electronic Supplementary Material (ESI) for Nanoscale.

Electronic Supporting Information

For

In-situ construction heterojunction over the surface of sandwich structure semiconductor for highly efficient photocatalytic H_2 evolution under visible light irradiation

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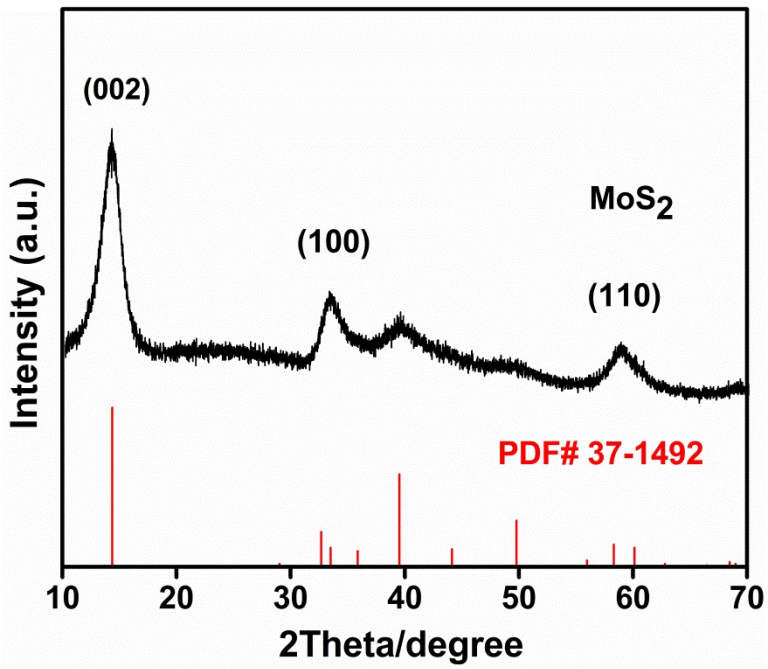

Fig. S1 XRD pattern of the synthesized MoS_2 by calcination in nitrogen atmosphere.

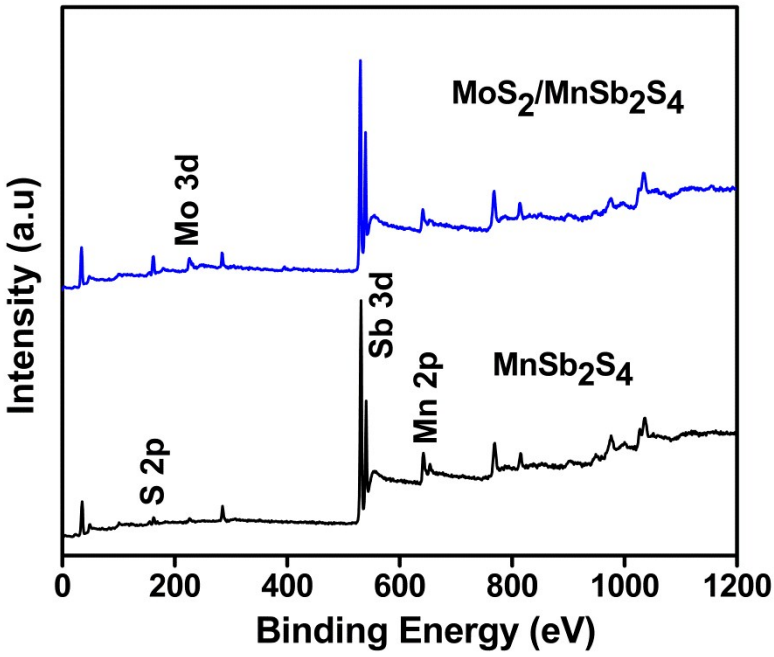

Fig. S2 XPS survey spectrum of $MoS_2/MnSb_2S_4$ composites and pure $MnSb_2S_4$.

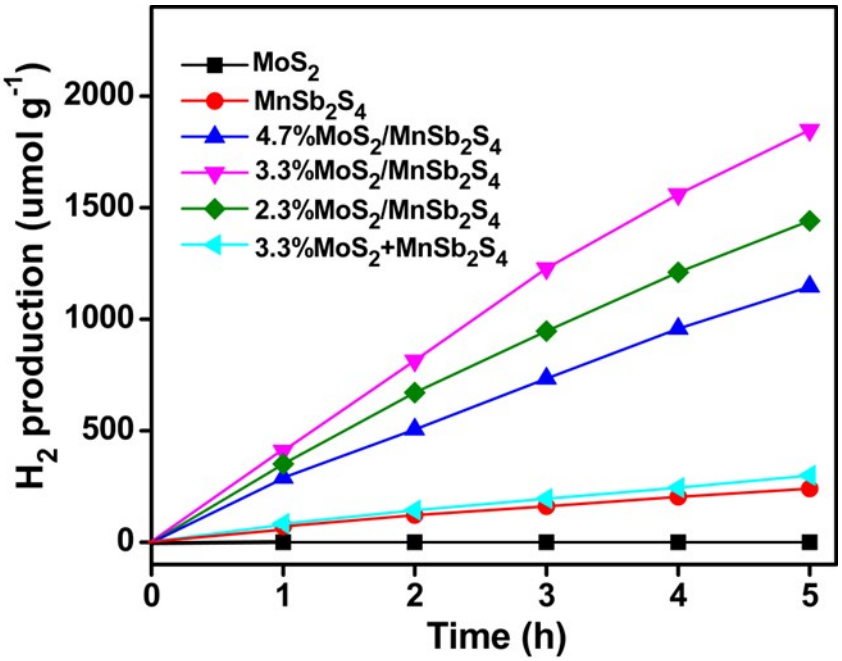

Fig. S3 The photocatalytic H_2 production for pure MoS_2, pure $MnSb_2S_4$, 4.7%MoS_2/$MnSb_2S_4$, 3.3%MoS_2/$MnSb_2S_4$, 2.3%MoS_2/$MnSb_2S_4$, and 3.3%MoS_2+$MnSb_2S_4$.

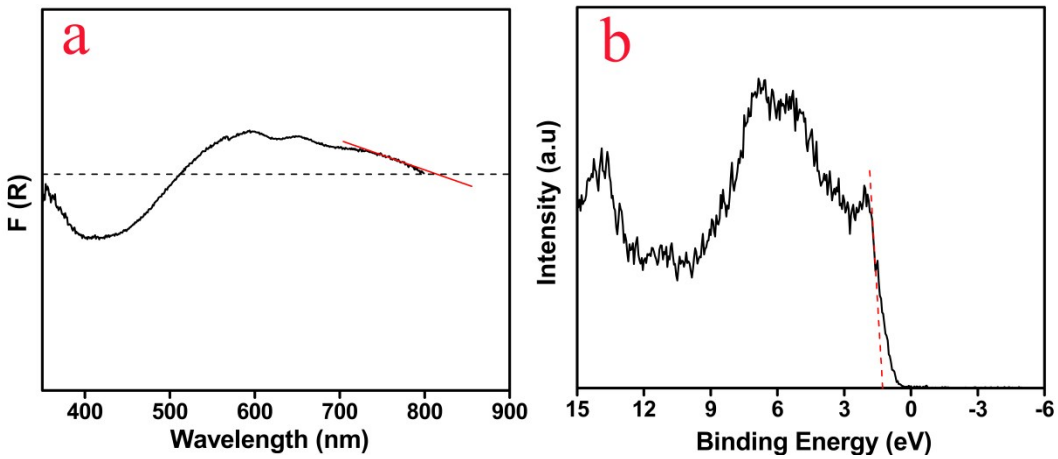

Fig. S4 (a) UV-Vis diffuse reflectance spectra of few-layer MoS_2; (b) VB spectrum of pure MoS_2 nanosheets by XPS. The similar result can be found in the literature.[1]

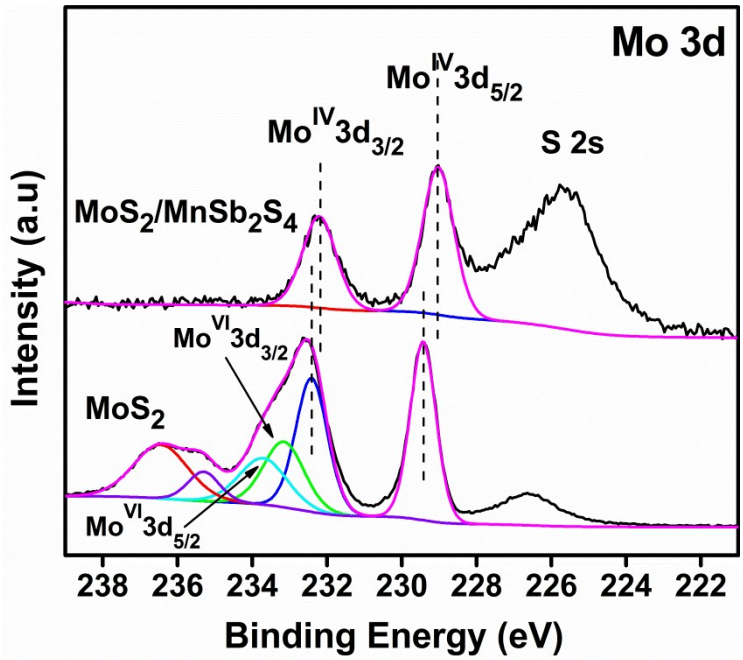

Fig. S5 Mo 3d XPS of the $MoS_2/MnSb_2S_4$ composites and pure MoS_2. The peaks at 233.8 and 233.2 eV were assigned to the Mo^{VI} $3d_{5/2}$ and Mo^{VI} $3d_{3/2}$, respectively, indicating that Mo^{6+} less existed in the pure MoS_2 due to slight surface oxidation upon exposure to air.[2]

Table S1 Actual loading amounts of MoS_2 on $MnSb_2S_4$ in all samples by ICP.

Samples	**$MnSb_2S_4$**	**2.3%$MoS_2/MnSb_2S_4$**	**3.3%$MoS_2/MnSb_2S_4$**	**4.7%$MoS_2/MnSb_2S_4$**
Actual (wt %)	0	2.34	3.33	4.72

References

1. M. H. Chiu, C. Zhang, H. W. Shiu, C. P. Chuu, C. H. Chen, C. Y. Chang, C. H. Chen, M. Y. Chou, C. K. Shih and L. J. Li, Nature communications, 2015, 6, 7666.

2. X. Hai, K. Chang, H. Pang, M. Li, P. Li, H. Liu, L. Shi and J. Ye, *Journal of the American Chemical Society*, 2016.