In situ photodeposition of MoS$_2$ on CdS nanorods as a highly efficient cocatalyst for photocatalytic hydrogen production

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Electronic Supplementary Information (ESI)

Fig. S1 (a) XRD and (b) FT-IR spectrum of the prepared ATTM.

The XRD result (Fig. S1a) indicated that the prepared ATTM is in a highly crystalline orthorhombic structure and the diffraction peaks can be indexed to standard (NH$_4$)$_2$MoS$_4$ (ICDD-JCPDS Card No. 48-1662).

The FTIR spectrum (Fig. S1b) is consistent with the reported (NH$_4$)$_2$MoS$_4$ reference spectrum$^1$ and the Mo-S stretching bands at 487 cm$^{-1}$ can be observed.
Photodeposition route has been extensively used for the loading of noble metal like Pt and Pd on photocatalyst since it reported in 1978. The validity of this method has been fully confirmed by the reported works. The related works have been commented by a recent review paper. Using this method for the deposition of Pt on CdS also has been reported. Thus, theoretically, we believe that Pt can be loaded on CdS-N by photodeposition route. Here, the TEM and HRTEM images of Pt modified CdS-N were measured. Some Pt particles can be identified as denoted by the arrows.

The actual Pt loading amount was determined to be 0.13% by ICP (Fig. S3). At last, compared with pristine CdS-N, the improved HER activity for the Pt/CdS-N also suggests the loading of Pt on CdS-N. Therefore, the experimental results also confirmed that Pt can be loaded on CdS-N by photodeposition route.

Fig. S3 the characteristic ICP emission line (265.9 nm) of Pt element.
**Fig. S4** Cycling photocatalytic HER over pristine CdS-N under visible light irradiation for 2 runs.
References


