Electronic Supplementary Material (ESI) for Materials Chemistry Frontiers.

Supporting Information

1T-phase MoS_2 quantum dots as a superior to Pt co-catalyst decorated on carbon nitride nanorods for photocatalytic hydrogen evolution from water

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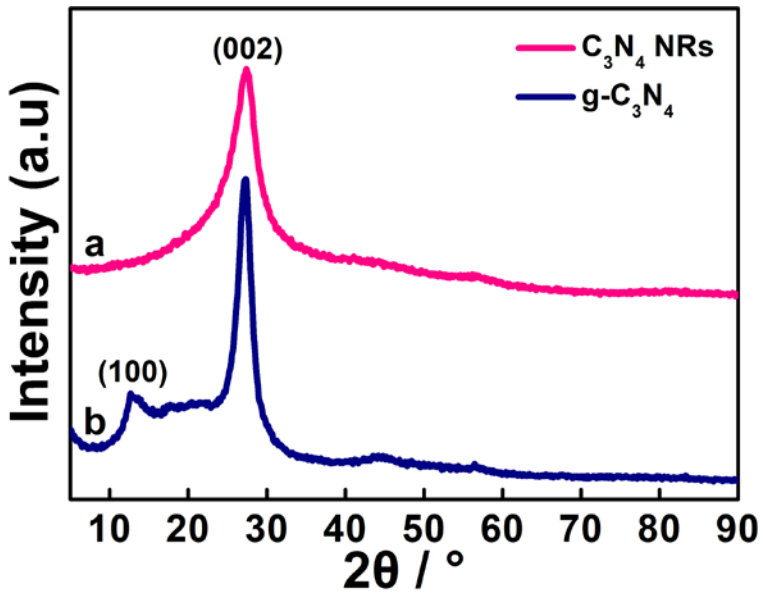

Fig. S1. XRD patterns of g-C_3N_4 nanosheets and C_3N_4 NRs.

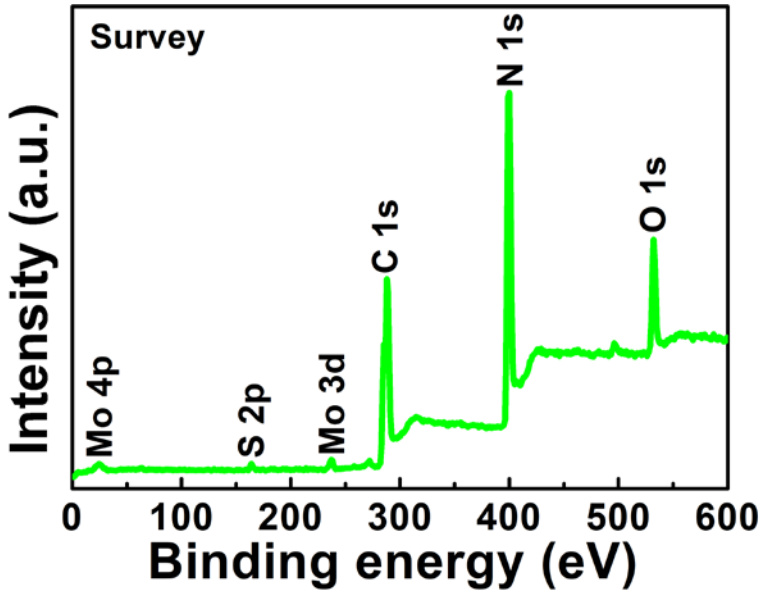

Fig. S2. XPS survey spectra of 1T-MoS_2@C_3N_4 NRs composites (5.0 wt%).

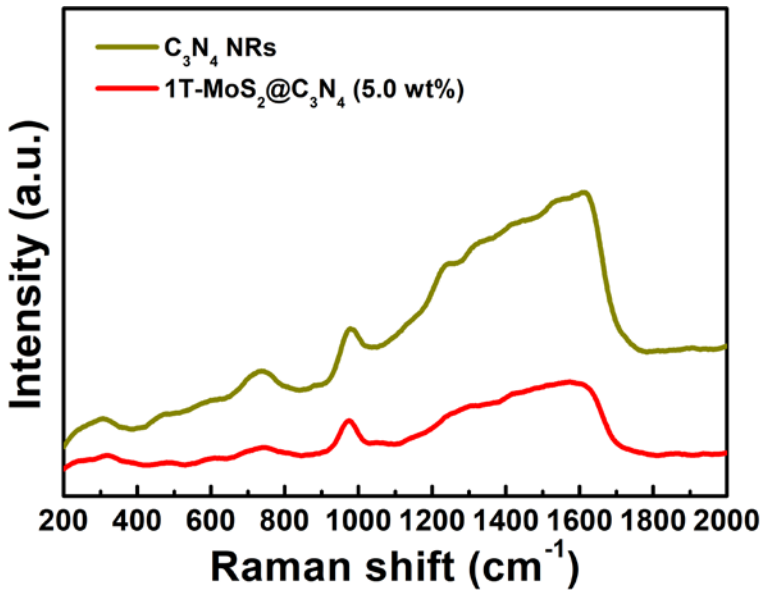

Fig. S3. Raman spectra of C_3N_4 NRs and 1T-MoS_2@C_3N_4 NRs composites (5.0 wt%).

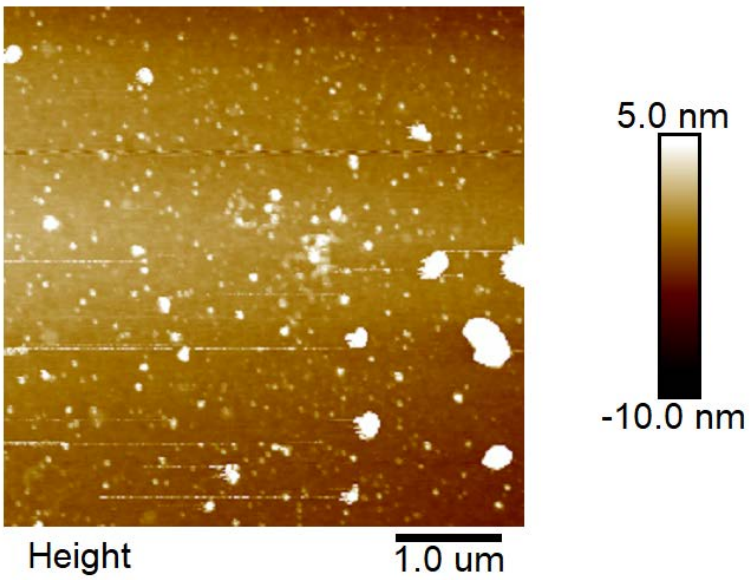

Fig. S4. The atomic force microscopy (AFM) image of 1T-MoS_2 QDs.

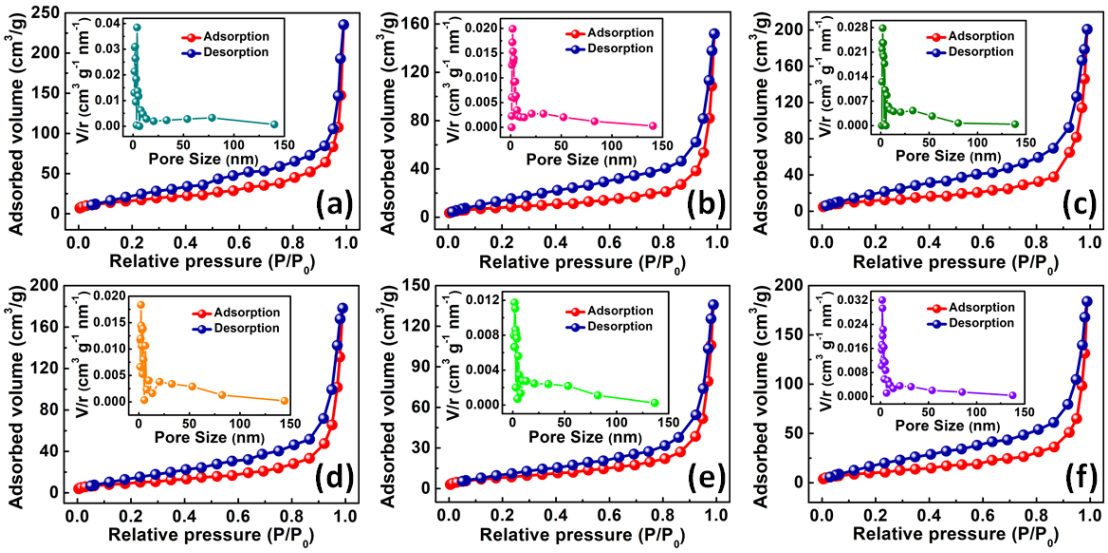

Fig. S5. Nitrogen adsorption/desorption isotherms of (a) C_3N_4 NRs and 1T-MoS_2@C_3N_4 NRs composites containing different amounts of 1T-MoS_2 QDs: (b) 0.5, (c) 1.0, (d) 3.0, (e) 5.0 and (f) 7.0 wt% (inset shows the corresponding BJH pore size distribution curves).

Table S1. BET surface area of C_3N_4 NRs and 1T-MoS_2@C_3N_4 NRs photocatalysts containing different amounts of 1T-MoS_2 QDs (0.5, 1.0, 3.0, 5.0 and 7.0 wt%).

Samples	BET Surface area ($m^2 g^{-1}$)
C_3N_4 NRs	61.769
1T-MoS_2@C_3N_4-0.5 wt%	29.273
1T-MoS_2@C_3N_4-1.0 wt%	43.074
1T-MoS_2@C_3N_4-3.0 wt%	34.834
1T-MoS_2@C_3N_4-5.0 wt%	30.850
1T-MoS_2@C_3N_4-7.0 wt%	40.015

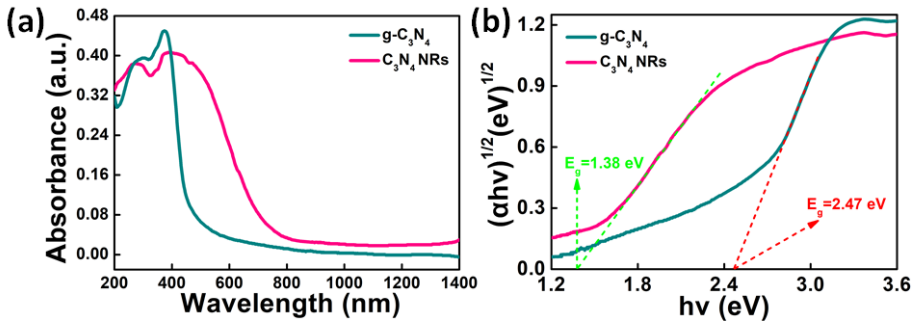

Fig. S6. (a) UV-vis-NIR diffuse reflectance spectra and (b) band gap values of g-C_3N_4 nanosheets and C_3N_4 NRs.

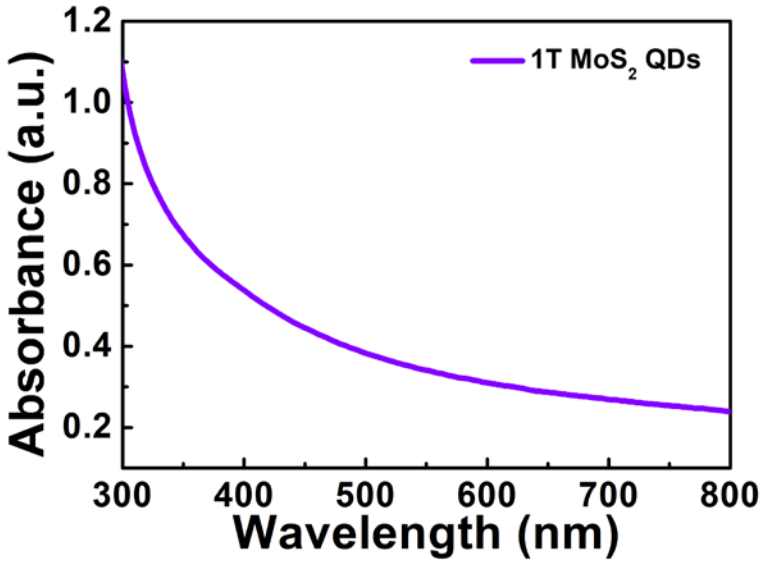

Fig. S7. UV-vis-NIR diffuse reflectance spectrum of 1T-MoS_2 QDs.

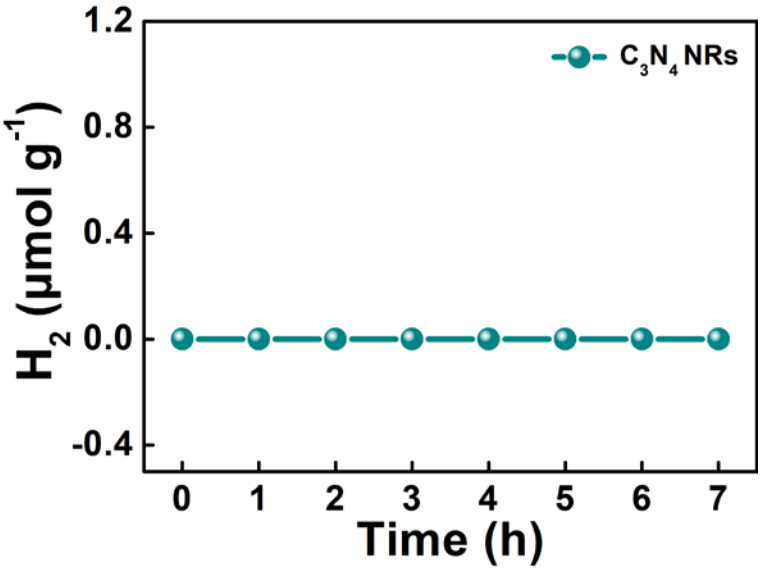

Fig. S8. Photocatalytic H_2 production curves of pure C_3N_4 NRs as control experiments

in the absence of cocatalyst.

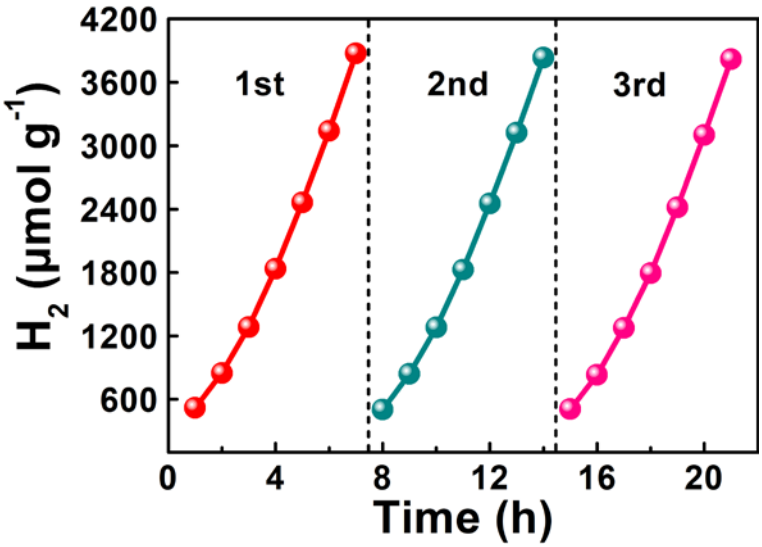

Fig. S9. Stability and recyclability of the 1T-MoS_2@C_3N_4 NRs (5.0 wt%).

Table S2. Comparison of AQE values over C_3N_4 NRs, Pt@C_3N_4 NRs and 1T-MoS_2@C_3N_4 NRs photocatalysts containing different amounts of 1T-MoS_2 QDs (0.5, 1.0, 3.0, 5.0 and 7.0 wt%) under simulated solar light.

Sample	AQE values (%)
C_3N_4 NRs	0
Pt@C_3N_4 NRs	0.99
1T-MoS_2@C_3N_4-0.5 wt%	0.47
1T-MoS_2@C_3N_4-1.0 wt%	1.13
1T-MoS_2@C_3N_4-3.0 wt%	1.31
1T-MoS_2@C_3N_4-5.0 wt%	1.73
1T-MoS_2@C_3N_4-7.0 wt%	1.21

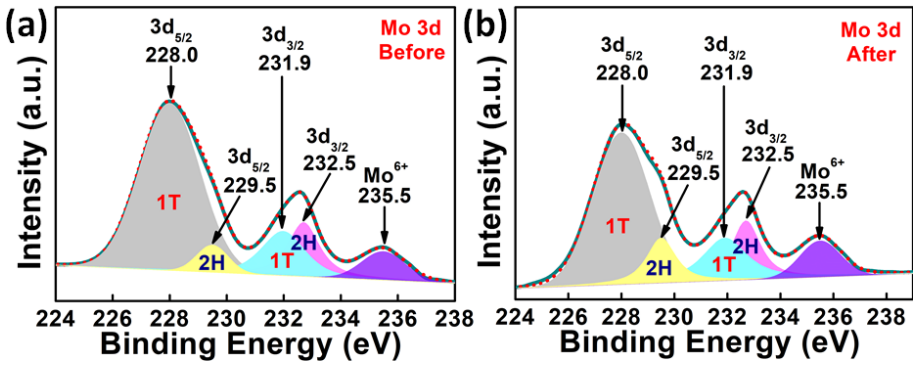

Fig. S10. High-resolution peaking-fitting XPS spectra of Mo 3d of 1T-MoS_2@C_3N_4 NRs composites (5.0 wt%) (a) before cycling and (b) after cycling.

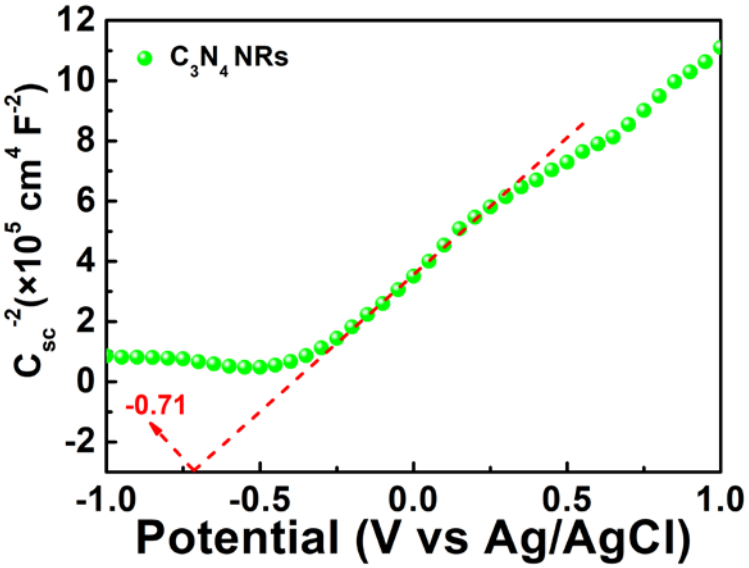

Fig. S11. Mott-Schottky plots of C_3N_4 NRs.