Quantum dot sensitized O-linked heptazine polymer photocatalyst for metal-free visible light hydrogen generation

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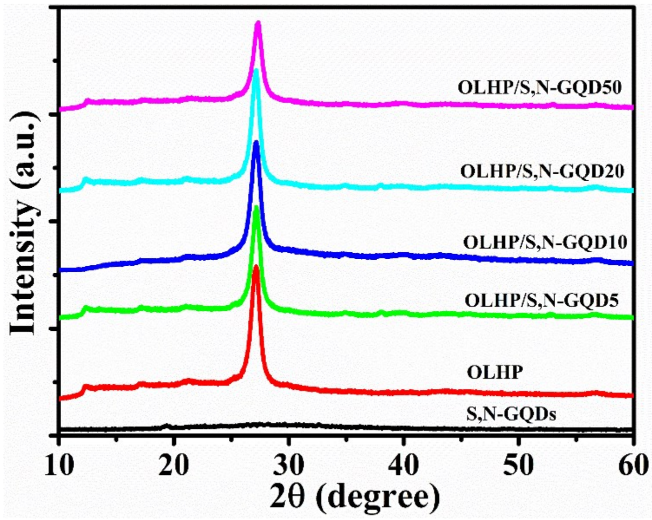

Figure S1. Powder XRD patterns of OLHP and OLHP/S,N-GQDs.

Table S1. Investigation of presence of S,N-GQDs by measuring normalized weight and atomic % of S through elemental analysis.

Photocatalyst	Normalized wt % of S	Normalized atomic % of S
OLHP	0	0
OLHP/S,N-GQD5	0.92	0.38
OLHP/S,N-GQD10	1.72	0.71
OLHP/S,N-GQD20	4.03	1.66
OLHP/S,N-GQD50	8.16	3.43

Table S2. The type of bonding, binding energy (eV) and full width at half maximum (FWHM) of XPS peaks.

Type of bonding	Binding energy (eV)	FWHM
S 2p	164.2	1.43
C-C	284.5	0.81
N-(C)3	288.2	0.66
N-C=N	286.6	0.95
C-O	532.3	1.15
C=O	531.4	1.03
C-N=C	398.5	0.55
N-(C)3	399.4	1.22
C-N-H	400.9	0.76
N-Oxide	404.3	0.93

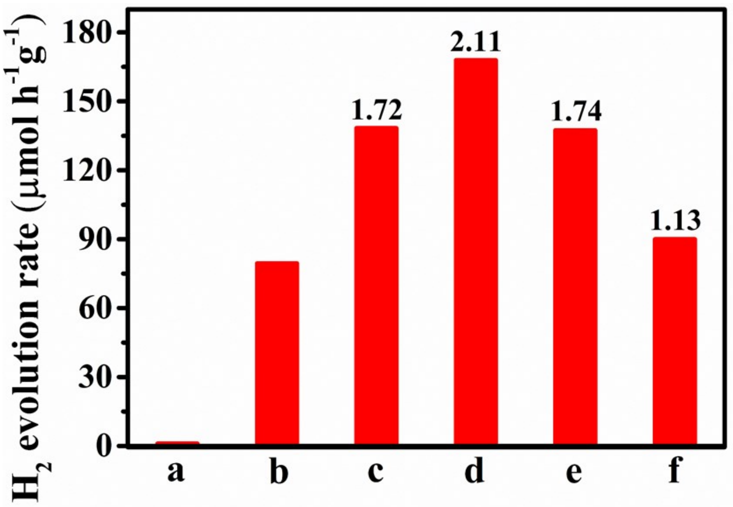

Figure S2. Comparison of HER with 2 wt% Pt as co-catalyst of (a) S,N-GQDs, (b) OLHP, (c) OLHP/S,N-GQD5, (d) OLHP/S,N-GQD10 (e) OLHP/S,N-GQD20 and (f) OLHP/S,N-GQD50.

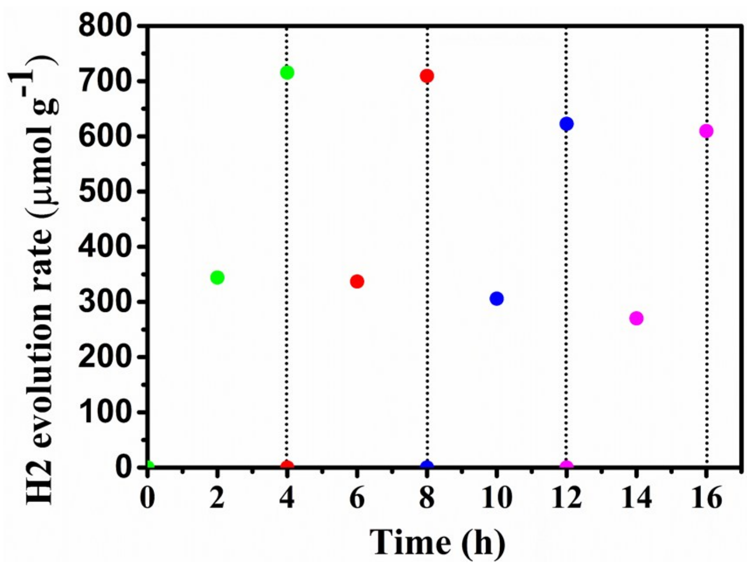

Figure S3. Stability cycle of H_2 evolution with 2 wt% Pt as co-catalyst of OLHP/S,N-GQD10.

We have carried out the photocatalytic experiment with varying ratio of H_2O and TEOA for the photocatalyst OLHP/S,N-GQD10 with 2 wt% platinum as co-catalyst. We haven't detected hydrogen without the sacrificial agent. The results shows that with 1:1 ratio of H_2O and TEOA, hydrogen evolution drop to 46 μmol h^{-1} g^{-1}. Using 100% TEOA for the photocatalysis we got 13 μmol h^{-1} g^{-1} of hydrogen evolution rate, which is very less compared to 167.8 μmol g^{-1} h^{-1} for the 9:1 ratio of H_2O and TEOA. So, we can conclude that majority of H_2 production coming from water splitting.

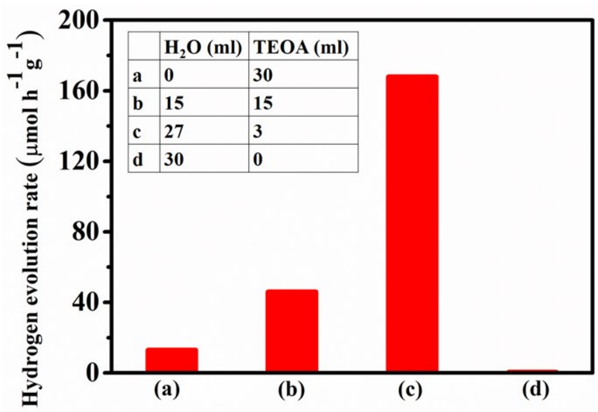

Figure S4. Hydrogen evolution rate for different ration of H_2O and TEOA.