

Supporting Information

Hydrogen Evolution System Based on Hybrid Nanogel Films with Capabilities of Spontaneous Moisture Collection and High Light Harvesting

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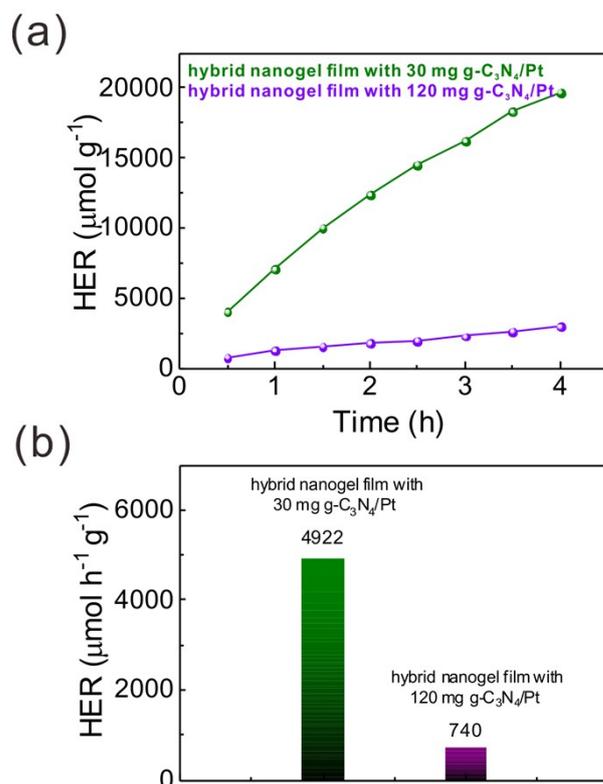


Figure S1. (a) HER values of the hybrid $\text{P}(\text{MEO}_2\text{MA-co-OEGMA}_{300})/\text{g-C}_3\text{N}_4/\text{Pt}$ nanogel film with different amount of $\text{g-C}_3\text{N}_4/\text{Pt}$ nanosheets (30 mg, green curve and 120 mg, violet curve) in non-aqueous environment (N_2 atmosphere). (b) Comparison of average HER values of hybrid $\text{P}(\text{MEO}_2\text{MA-co-OEGMA}_{300})/\text{g-C}_3\text{N}_4/\text{Pt}$ nanogel film with different amount of $\text{g-C}_3\text{N}_4/\text{Pt}$ nanosheets (30 mg, green column and 120 mg, violet column) in non-aqueous environment (N_2 atmosphere).

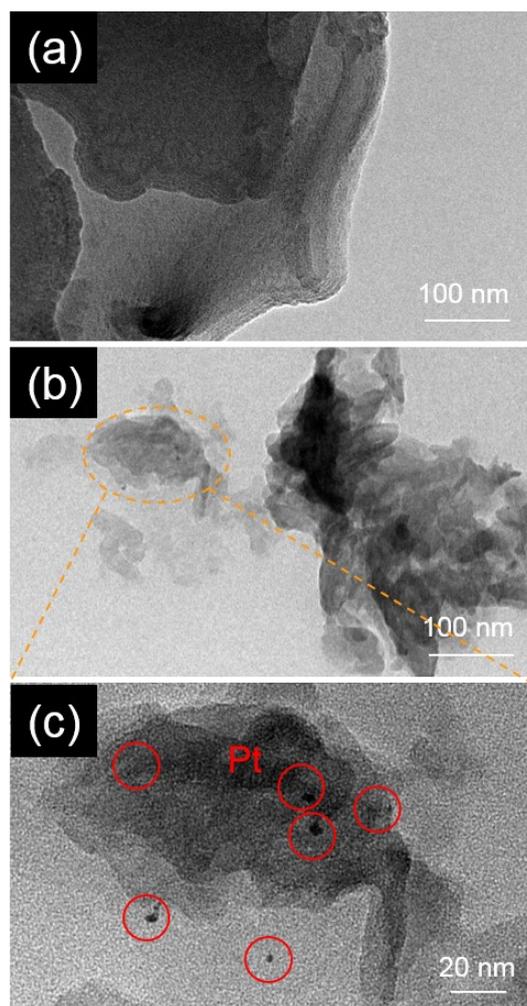


Figure S2. TEM images of the g-C₃N₄ nanogels (a) and g-C₃N₄/Pt nanogels (b and c) on solid supports. The zoomed in region in (b) is indicated in orange. In the zoom-in (c), the position of Pt is indicated in red.

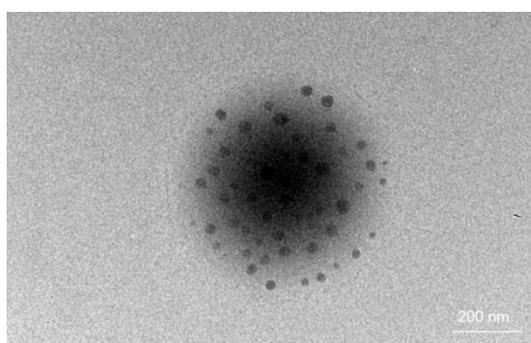


Figure S3. TEM image of the hybrid P(MEO₂MA-co-OEGMA₃₀₀)/g-C₃N₄/Pt nanogel on a solid support.

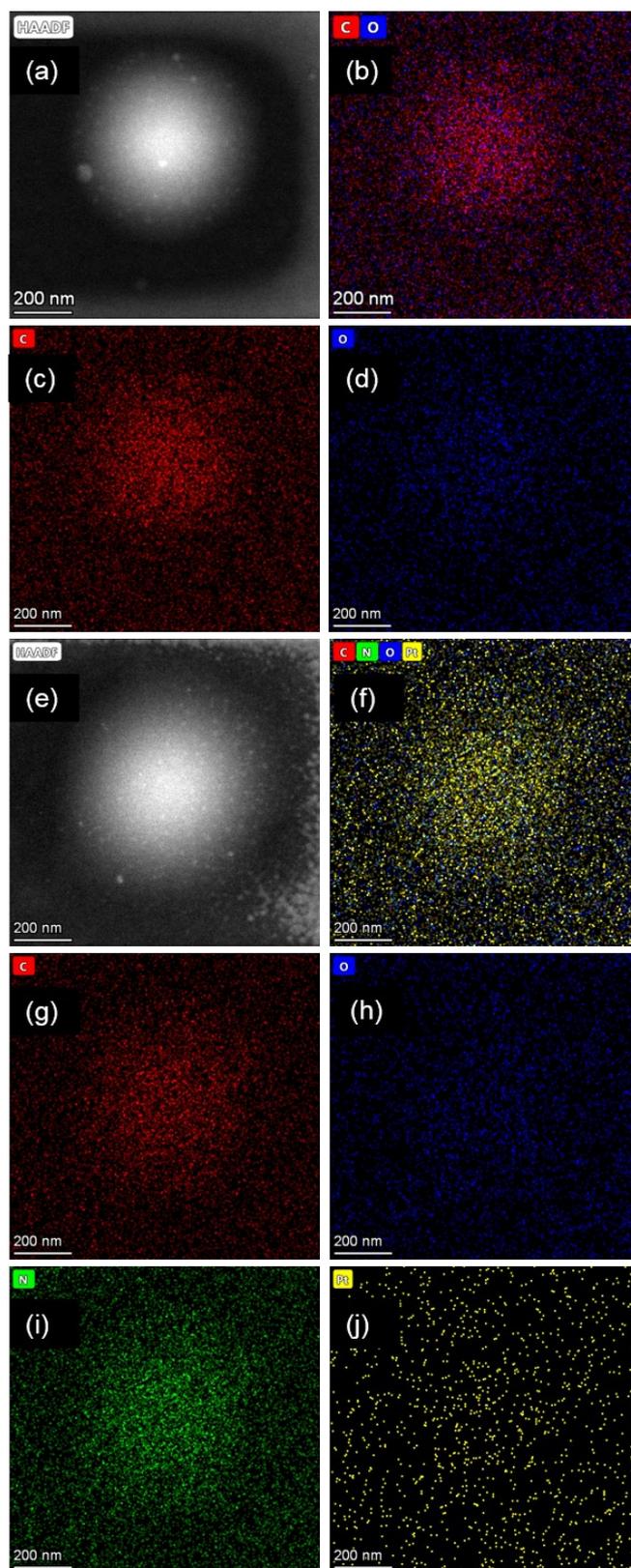


Figure S4. STEM images of the P(MEO₂MA-*co*-OEGMA₃₀₀) nanogels (a) and hybrid P(MEO₂MA-*co*-OEGMA₃₀₀)/g-C₃N₄/Pt nanogels (e). EDS mapping profiles for P(MEO₂MA-*co*-OEGMA₃₀₀) nanogels (b, c and d) and hybrid P(MEO₂MA-*co*-OEGMA₃₀₀)/g-C₃N₄/Pt nanogels (f, g, h, i and j). The element measured are marked on the left upper side of the images.

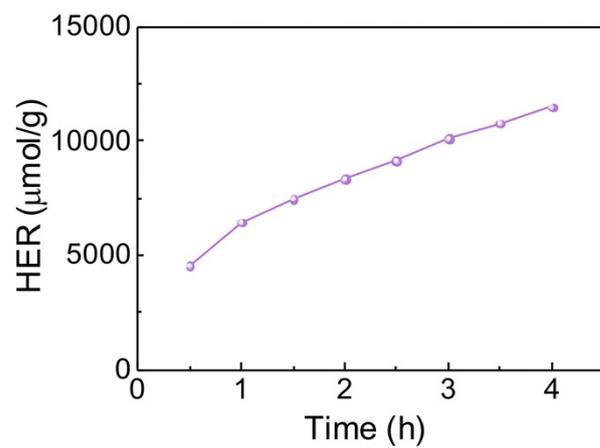


Figure S5. HER values of the hybrid P(MEO₂MA-*co*-OEGMA₃₀₀)/g-C₃N₄/Pt nanogel film with thickness of 0.5 mm in non-aqueous environment (N₂ atmosphere).

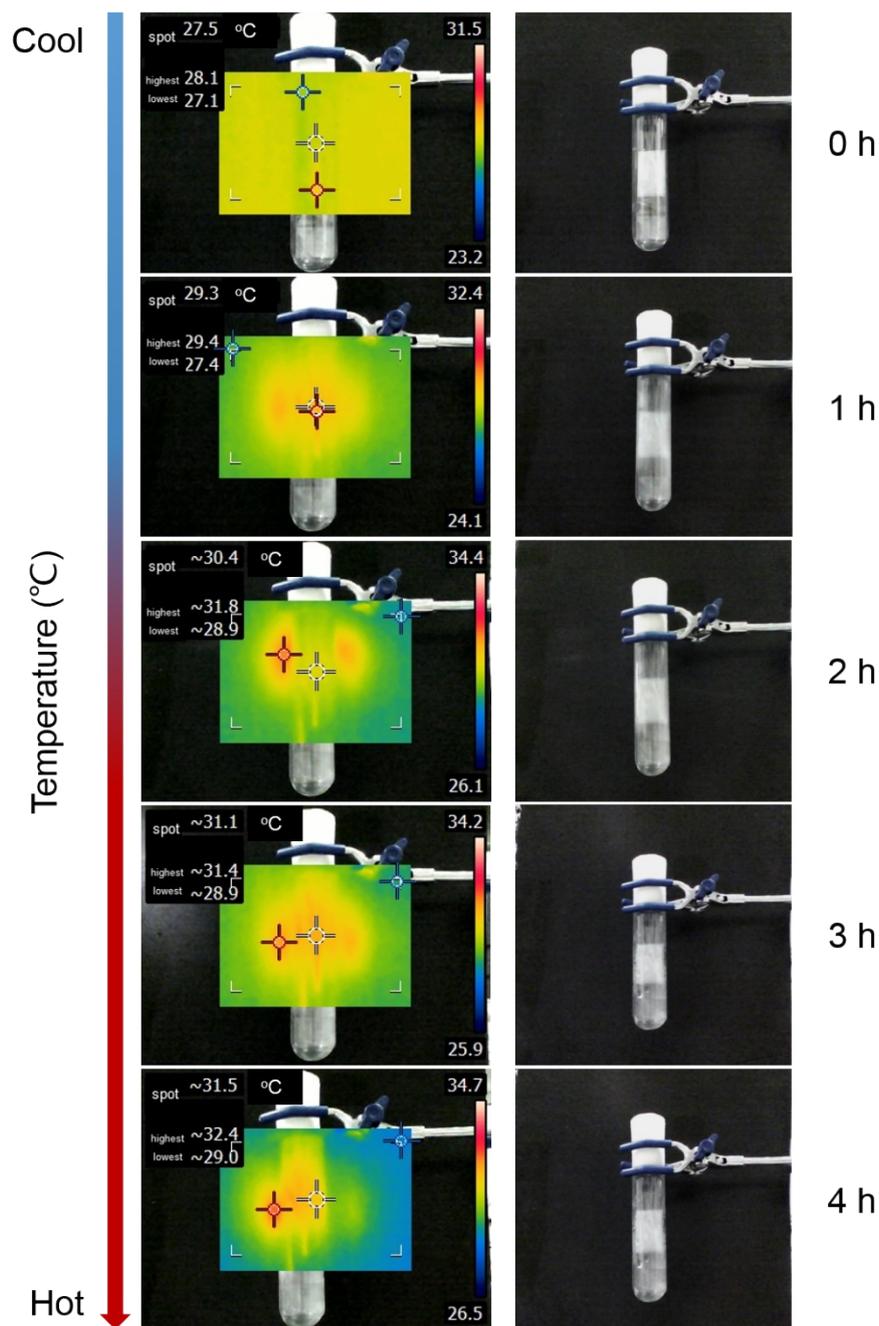


Figure S6. Infrared thermal images (left) and corresponding digital images (right) of the hybrid P(MEO₂MA-co-OEGMA₃₀₀)/g-C₃N₄/Pt nanogel film in photocatalytic hydrogen evolution measurement from top to bottom with xenon lamp irradiation for 0, 1, 2, 3 and 4 h, respectively.

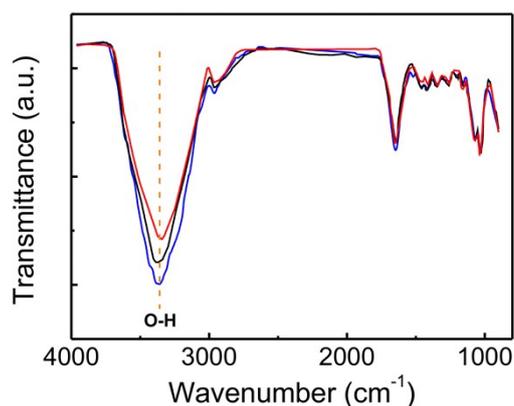


Figure S7. ATR-FTIR spectra of the swollen hybrid P(MEO₂MA-*co*-OEGMA₃₀₀)/g-C₃N₄/Pt nanogel film after the different irradiation durations (0 h: blue, 2 h: black and 4 h: red). The characteristic peak related to O-H groups decreases with irradiation time, indicating loss of water.

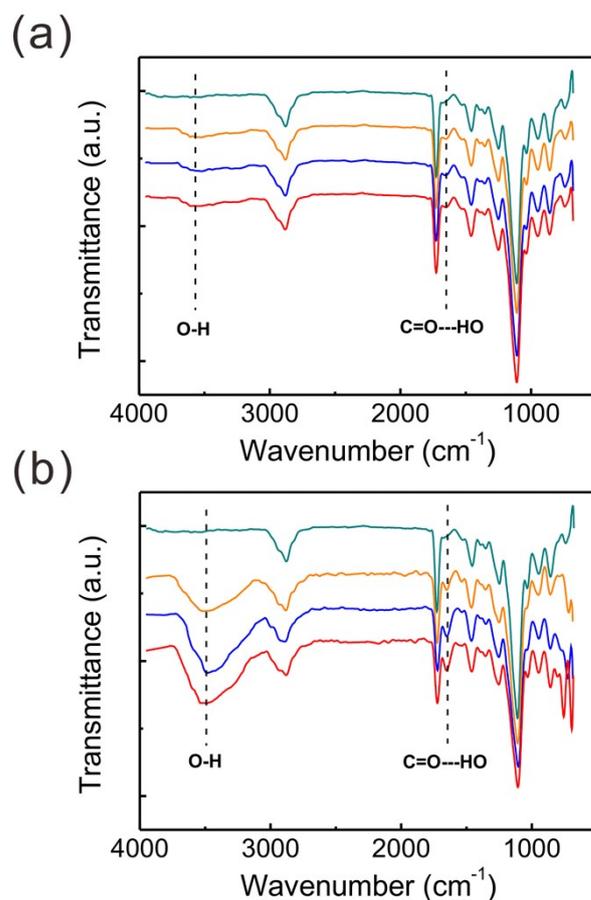


Figure S8. ATR-FTIR spectra of the P(MEO₂MA-*co*-OEGMA₃₀₀) nanogel film at different exposure time (0 h: dark cyan, 0.5 h: orange, 1 h: blue and 2 h: red) in water vapor atmosphere with (a) RH = 40% and (b) RH = 80%. Characteristic peaks are indicated.