
Supplementary Information

Enhanced visible-light photocatalytic activity of perylene diimide (PDI) supramolecular nanorods with Pt QDs in situ deposited.

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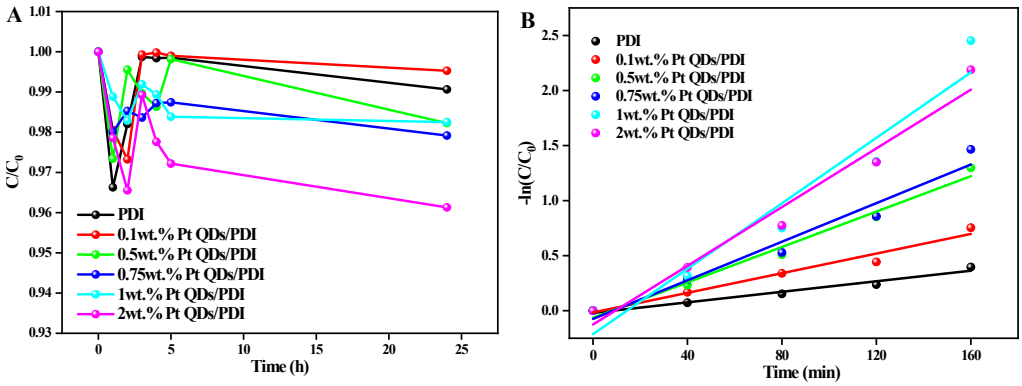

Fig. S1 (A) Curves of composites for adsorption phenol under dark and (B) The first order kinetics curve fitting of composites degradation phenol.

Before the photocatalytic reaction test, in order to eliminate the contribution of adsorption to the removal of phenol, a dark adsorption-desorption equilibrium test was performed in advance. As can be seen in Fig. S1A, compared to the photocatalytic degradation, the effect of dark adsorption was so small that could be ignored.

Tab S1 Apparent rate contants k of several reported PDI-based catalysts (25 mg) degradation phenol (5 ppm, 50 mL) under visible light irradiation (500 W xenon lamp , $\lambda > 420$nm).

Photocatalyst	Apparent rate contants k	Multiples relative to pure PDI
PDI@AuNPs[1]	0.307 h^{-1}	1.72
PDI/O-CN[2]	0.164 h^{-1}	1.3
r-GO/PDI[3]	0.465 h^{-1}	2.46
PDI/Bi_2WO_6[4]	0.357 h^{-1}	1.75
PDI/C_{60}[5]	0.216 h^{-1}	2.27
GQDs/PDI[6]	0.01831 min^{-1}	4.73
1wt.% Pt QDs/PDI composite	0.0149 min^{-1}	6.2

1wt.% Pt QDs/PDI composite degraded 91.40% of the phenol (5 ppm) during 160 min under visible light irradiation. What's more, Pt QDs/PDI had a better

photodegradation of phenol activity than some reported PDI-based catalysts under visible light irradiation (Tab S1).

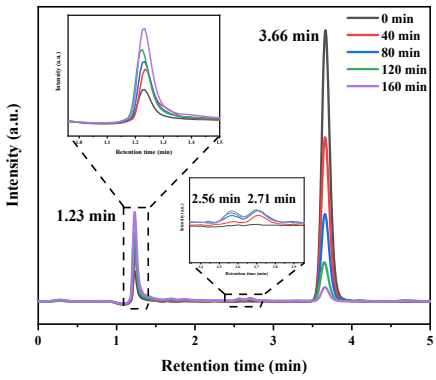

Fig. S2 HPLC chromatograms with the photocatalyst of 1wt.% Pt QDs/PDI composite monitoring the photodegradation process of phenol at interval times under visible light irradiation.

To further figure out the phenol degradation pathways, identification for degradation intermediates were monitored by HPLC (Fig S2). Distinctly, the peak of phenol located at the retention time of 3.66 gradually reduced with prolonged reaction time of photocatalytic process. Besides, the other increasing peaks of intermediate products at 1.23 min, 2.56 min and 2.71 min can be attributed to maleic acid, p-benzoquinone and bi-phenol[1,6,7].

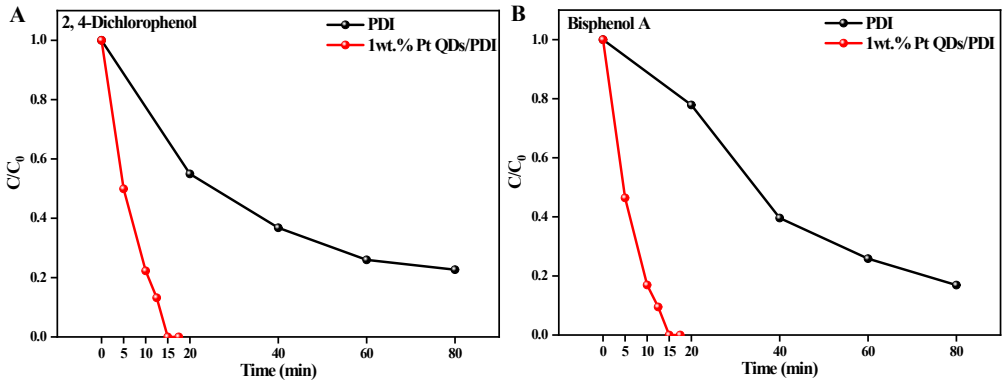

Fig. S3 (A) The degradation plot of 2, 4-dichlorphenol (5 ppm) and (B) Bisphenol A (5 ppm) in the presence of pure PDI supramolecular nanorods and 1wt.% Pt QDs/PDI composite under visible light irradiation.

As shown in Fig. S3, Pt QDs/PDI composite showed the same photocatalytic degradation performance for phenol derivatives such as 2, 4-dichlorophenol and bisphenol A, and the degradation rate was better than that of phenol (Fig. S4).

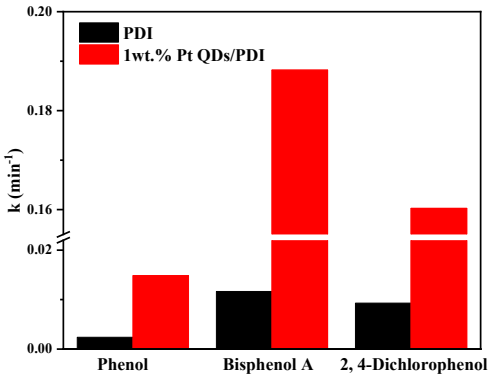

Fig. S4 The degradation rate constants k calculated from degradation plots over phenol, bisphenol A and 2, 4-dichlorphenol in the presence of pure PDI supramolecular nanorods and 1wt.% Pt QDs/PDI composite under visible light irradiation.

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