Electronic Supplementary Material

Improving hole transfer of boron nitride quantum dots modified PDI for efficient photodegradation

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1. Experimental Section

1.1 Characterization

The crystal structure of the samples was performed by X-ray diffraction (XRD) with Cu K_α radiation with λ = 0.15418 nm (Bruker D8 Advance). The Fourier transform infrared spectroscopy (FTIR) spectra were obtained by a Bruker spectrometer. The X-ray photoelectron spectroscopy (XPS) measurements were obtained from an ESCALAB 250 Xi instrument (Thermo Scientific) with Al Kα radiation under the light irradiation at λ = 365 nm (the C 1s = 284.60 eV binding energy is used as the energy standard for charging correction). The high-resolution transmission electron microscope (HR-TEM) (JEOL JEM-F200), scanning electron microscopy (SEM) (Hitachi S-4800), and were used to perform morphology and microstructure. Atomic Resolution analytical Microscope (AFM) was carried out

using Cypher VRS with Kelvin probe (HQ NSC18/Pt). The photoluminescence spectra (PL) spectra were recorded by a fluorescence spectrophotometer (Hitachi F-4600) made in Japan. The time-resolved fluorescence decay spectra (TRFL) were obtained on a time-resolved Fluorescence Spectrometers (FLS1000, Edinburgh Instruments). The UV–vis diffuse reflectance spectra (DRS) were acquired from the Hitachi U-3900 with $BaSO_4$ as the reflectance standard.

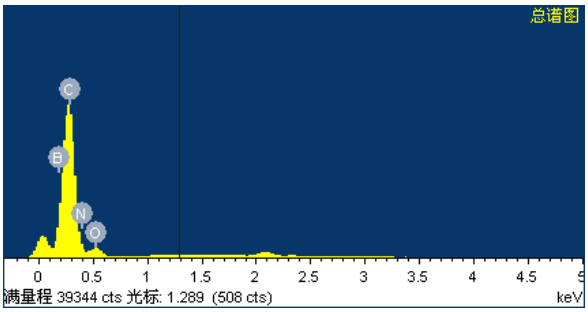

Figure. S1 Elemental distributions of PDI/BNQDs-10.

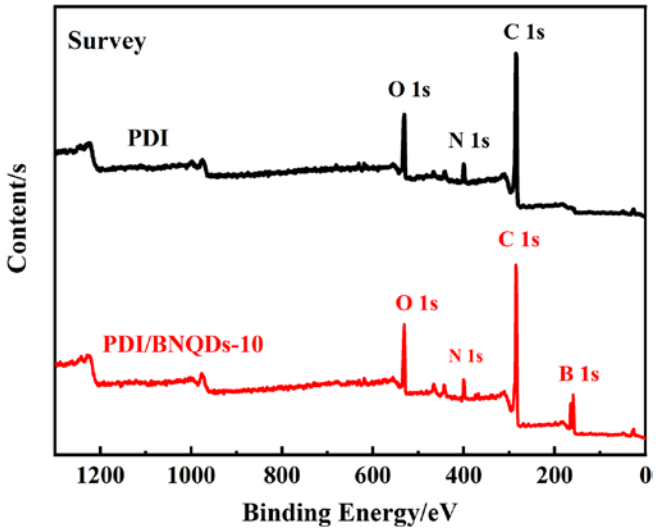

Figure. S2 XPS broad spectra of PDI supramolecular and PDI/BNQDs-10.

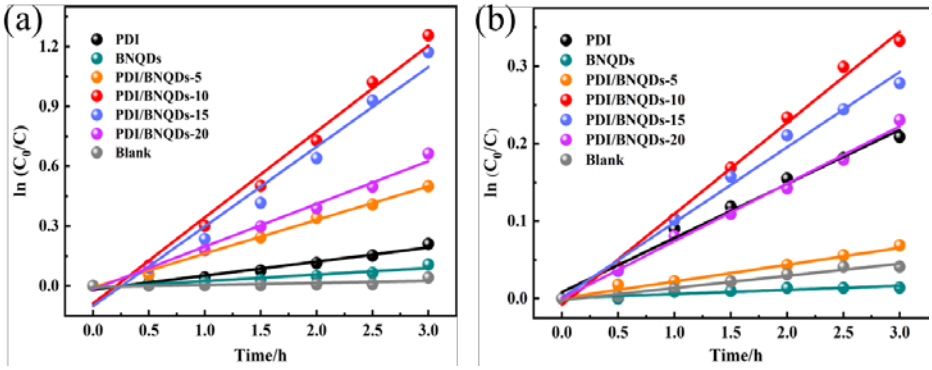

Figure. S3 The corresponding first order kinetics curve fitting of samples under visible light (λ>420 nm) (a) MB and (b) CI.

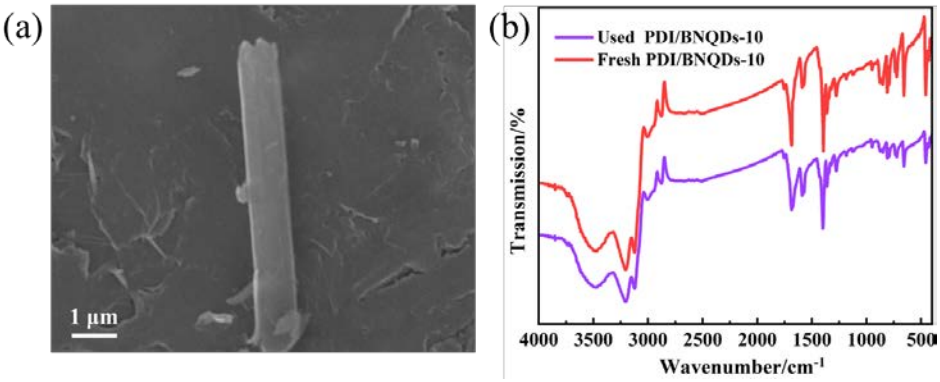

Figure. S4 (a) SEM image, (b) FT-IR spectra of PDI/BNQDs-10 before and after degradation reaction.

Table S1 Chemical composition of PDI/BNQDs-10.

Percentage of element atoms			
C	B	N	O
64.14	21.62	9.76	4.48

Table S2 Z potential of PDI supramolecular, BNQDs, and PDI/BNQDs-10.

Sample	**Z potential-1**	**Z potential-1**	**Z potential-3**	**Average potential**
PDI	-2.89 mV	-2.59 mV	-3.45 mV	-2.98 mV
BNQDs	-7.10 mV	-7.01 mV	-9.72 mV	-7.94 mV
PDI/BNQDs-10	-60.5 mV	-59.2 mV	-60.8 mV	-60.2 mV

Table S3 Comparison of the photocatalytic performance of MB and CI by different photocatalysts.

Material	Catalyst dose ($mg \cdot L^{-1}$)	MB ($mg \cdot L^{-1}$)	Efficiency (MB)	Efficiency (CI)	Ref.
PCP2-PDI	0.25	5	78% at 200 min		[1]
$Co_4I_3O_{24}H_{15} \cdot 3H_2O$	0.75	8	73% at 60 min		[2]
$ZnIn_2S_4/In_2O_3$	0.4	50	84.5% at 240 min		[3]
Cds@PANI/CFs	1.0	20	77.35% at 300 min		[4]
PDI/BNQDs	0.7	10	75% at 180 min	$K=0.118\ h^{-1}$	This work

References

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