Electronic Supplementary Information

Isopropanol-assisted synthesis of high stable MAPbBr₃/p-g-C₃N₄ intergrowth composite photocatalysts and their interfacial charge carrier dynamics

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Figure S1 (a, e) SEM images and (f) the corresponding XRD patterns of bulk b-g- C_3N_4 and protonated p-g- C_3N_4 nanosheets and (b-d) Energy-dispersive X-ray (EDX) mapping images of p-g- C_3N_4 , demonstrating that as-obtained sample is composed of C and N elements with even distribution.



Figure S2 (a) FTIR spectra of bulk b-g-C₃N₄ and protonated p-g-C₃N₄, (b) Tyndall effect p-g-C₃N₄-sol solution generated by a red laser and their photograph images, (c, d) Steady-state PL spectra and Time-resolved transient PL decay curves (TRPL) of g-C₃N₄ and p-g-C₃N₄.



Figure S3 (a) Topographic AFM image and (b) corresponding height profiles along the black line of the few-layer p-g- C_3N_4 .



Figure S4 (a) Standard concentration plot and (b) UV-vis spectrum of malachite green (MG) in IPA solvent. The inset is optical image of MG powder and its molecule structure. The concentrations of the various species observed were calculated using

the Beer–Lambert law: $A = \varepsilon cL$.

Sample	$ au_1$ (ns)	A ₁ (%)	$ au_2$ (ns)	A ₂ (%)	τ ₃ (ns)	A ₂ (%)	τ _{av} (ns)
b-C ₃ N ₄	4.72	41.1	0.76	25.9	33.3	33.0	28.6
$p-C_3N_4$	3.71	22.8	28.2	14.0	0.19	63.2	23.3
MAPbBr ₃ -p-C ₃ N ₄ -0	0.28	9.70	3.44	9.60	43.7	80.7	43.3
MAPbBr ₃ -p-C ₃ N ₄ -0.25	0.42	17.9	3.32	8.2	28.4	73.9	28.2
MAPbBr ₃ -p-C ₃ N ₄ -0.5	0.38	83.2	3.25	10.6	30.1	6.3	23.1
MAPbBr ₃ -p-C ₃ N ₄ -1	0.32	91.1	2.80	5.94	31.8	2.96	20.8
MAPbBr ₃ -p-C ₃ N ₄ -1.5	0.30	6.65	3.11	5.75	48.8	87.6	48.6

Table S1. Results of exponential fitting of PL decay traces of $MAPbBr_3/p$ -g-C₃N₄.

MAPbBr ₃ / p-C ₃ N ₄ -x	б (S/cm)	<i>n</i> (cm ⁻³)	μ (cm ⁻² /Vs)	<i>L</i> _D (μm)	
0	1.45×10 ⁻¹	-2.45×10 ¹⁶	37.21	6.44	
0.25	2.94×10 ⁻¹	-3.02×10 ¹⁶	60.78	6.64	
0.5	5.00×10 ⁻¹	-3.88×10 ¹⁶	80.54	6.92	
1.0	11.90×10 ⁻¹	-4.51×10 ¹⁶	165.02	9.39	
1.5	8.52×10 ⁻¹	-4.26×10 ¹⁶	125.05	12.50	

Table S2. Hall measurement and calculated carrier diffusion length (L_D) results of MAPbBr₃/p-C₃N₄-*x* samples.



Figure S5 (a, b) FTIR spectra of IPA solvent and MAPbBr₃/p-g-C₃N₄-1.0 sample, (c, d) XRD patterns the catalyst after the 1st and 10th reaction cycle and SEM image of 10th reaction cycle catalyst. The inset in b is molecular structure of malachite green with triphenylmethane groups.



Figure S6 (a) Relative concentration as a function of time for degradation of MG, cationic (RhB) and anionic (MO) dye pollutants, (b) the optical images of the solution completely turned to be colorless within 20 min and the molecular structure of MO and RhB dye.