Supporting information

Fabrication of a high-efficiency hydrogen generation photocatalysis Pd/C_3N_5-K,I through synergistic effects of planar and spatial carrier separation

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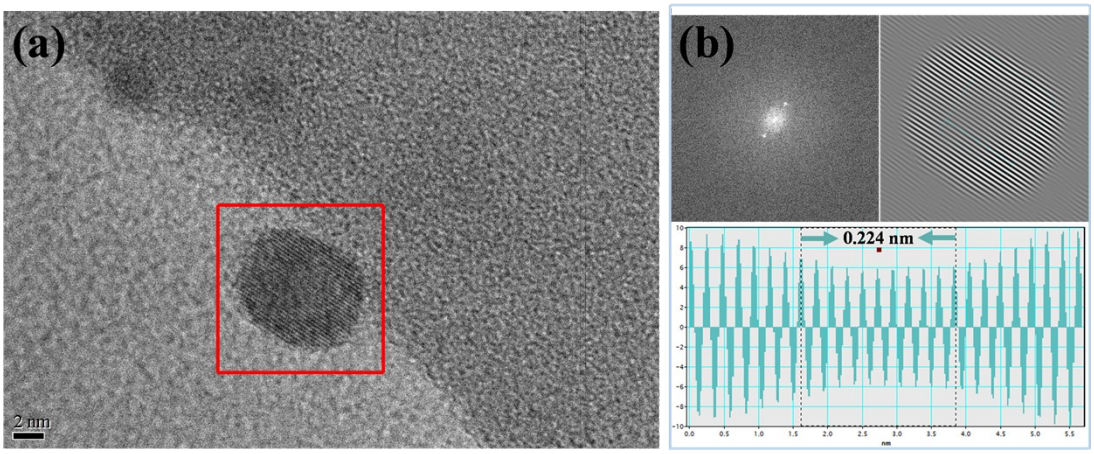

Figure S1. lattice spacing of Pd nanoparticles.

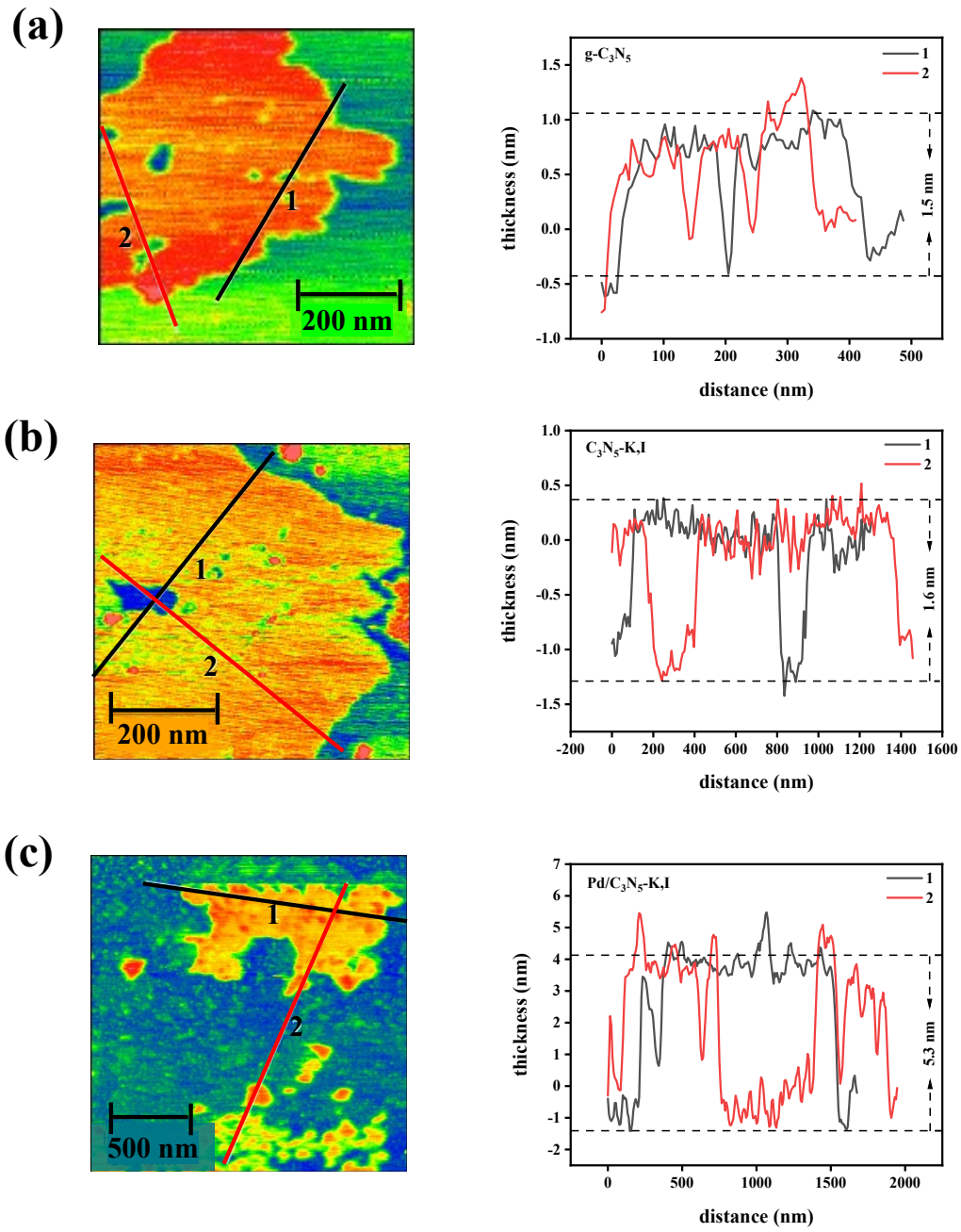

Figure S2. AFM images of (a) g-C_3N_5, (b) C_3N_5-K,I, and (c) Pd/C_3N_5-K,I

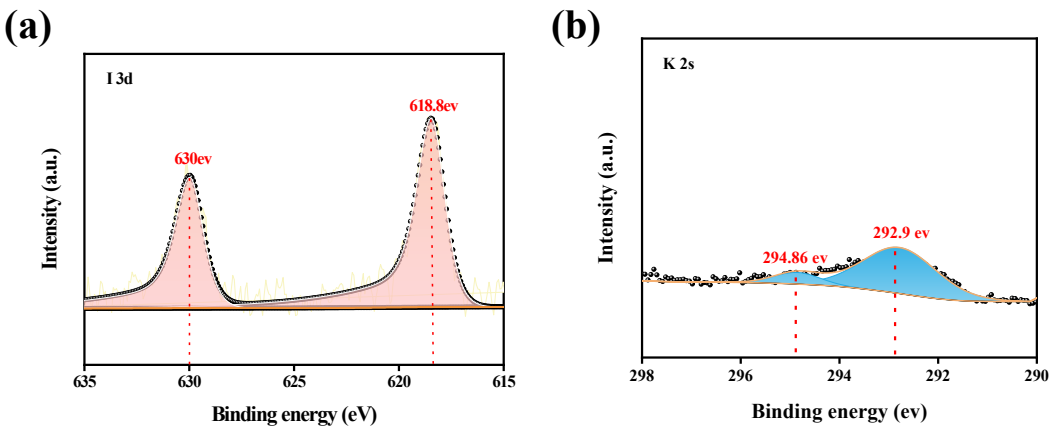

Figure S3. (a) XPS I 3d spectrum and (b) XPS K 2s spectrum of Pd/C_3N_5-K,I.

The K 2s peaks of Pd/C_3N_5-K,I are located at around 292.9 and 294.86 eV, demonstrating that K ions doped into Pd/C_3N_5-K,I.

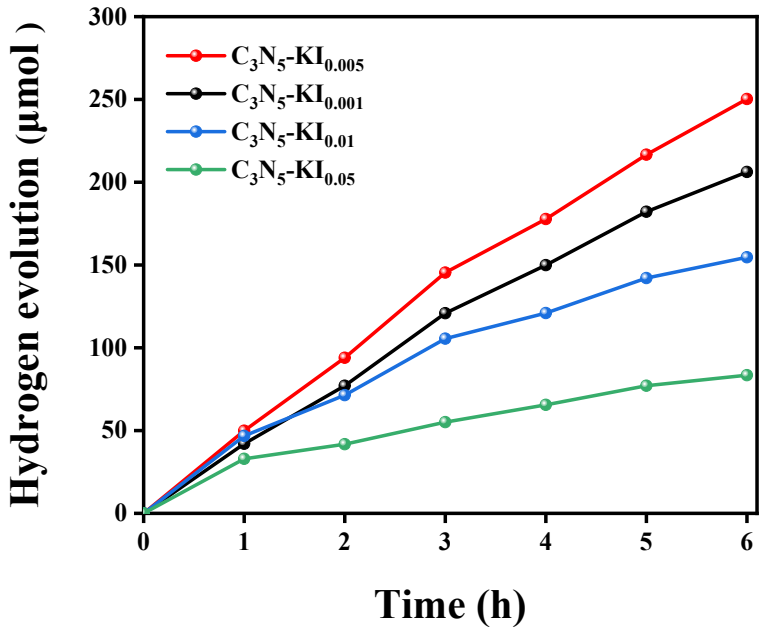

Figure S4. Photocatalytic H_2 evolution amounts of C_3N_5-K,I at different KI-to-C_3N_5 molar ratios.

The C_3N_5-K,$I_{0.005}$ (200 mg 3-amino-1,2,4-triazole and 60mg KI) shows the best H_2-evolution activity (250.3 μmol), which is used to synthesize Pd/C_3N_5-K,I.

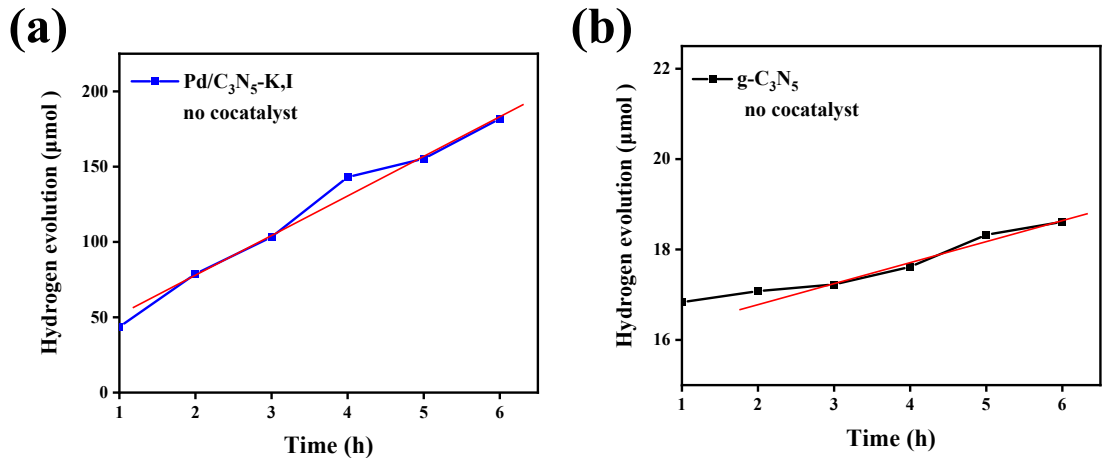

Figure S5. H_2 generation amounts for the Pd/C_3N_5-K,I (a), and g-C_3N_5 (b) without Pt.

The Pd/C_3N_5-K,I and g-C_3N_5 without Pt exhibit a partially linear growth trend in H_2 production.

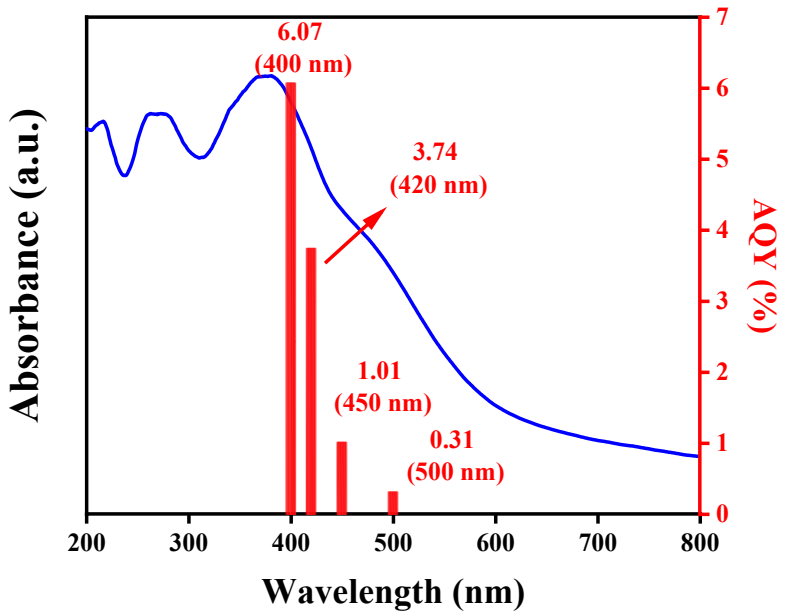

Figure S6. Wavelength dependence of AQY on H_2 evolution performance of Pd/C_3N_5-K,I.

The AQY of Pd/C_3N_5-K,I is 6.07% (400 nm), 3.74% (420 nm), 1.01% (450 nm) and 0.31% (500 nm), respectively, indicating a good correlation with the light absorption properties.

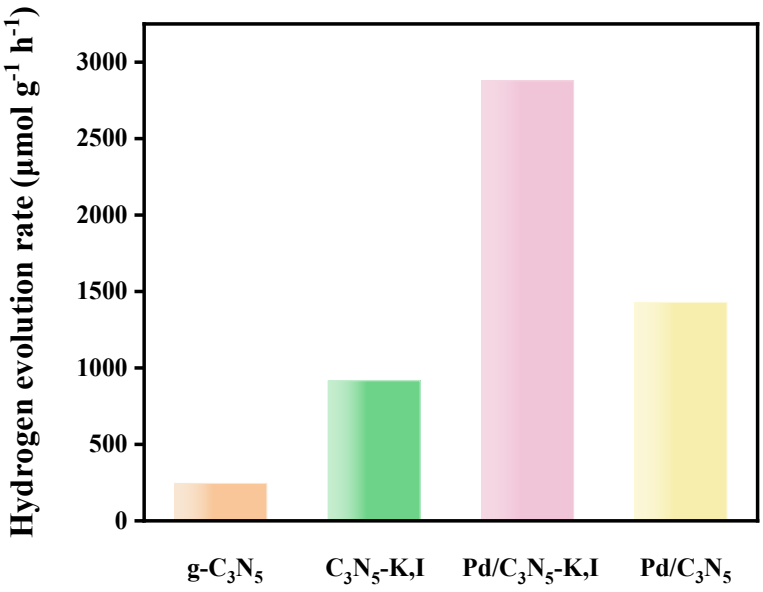

Figure S7. Photocatalytic H_2 evolution rates of g-C_3N_5, C_3N_5-K,I, Pd/C_3N_5 and Pd/C_3N_5-K,I.

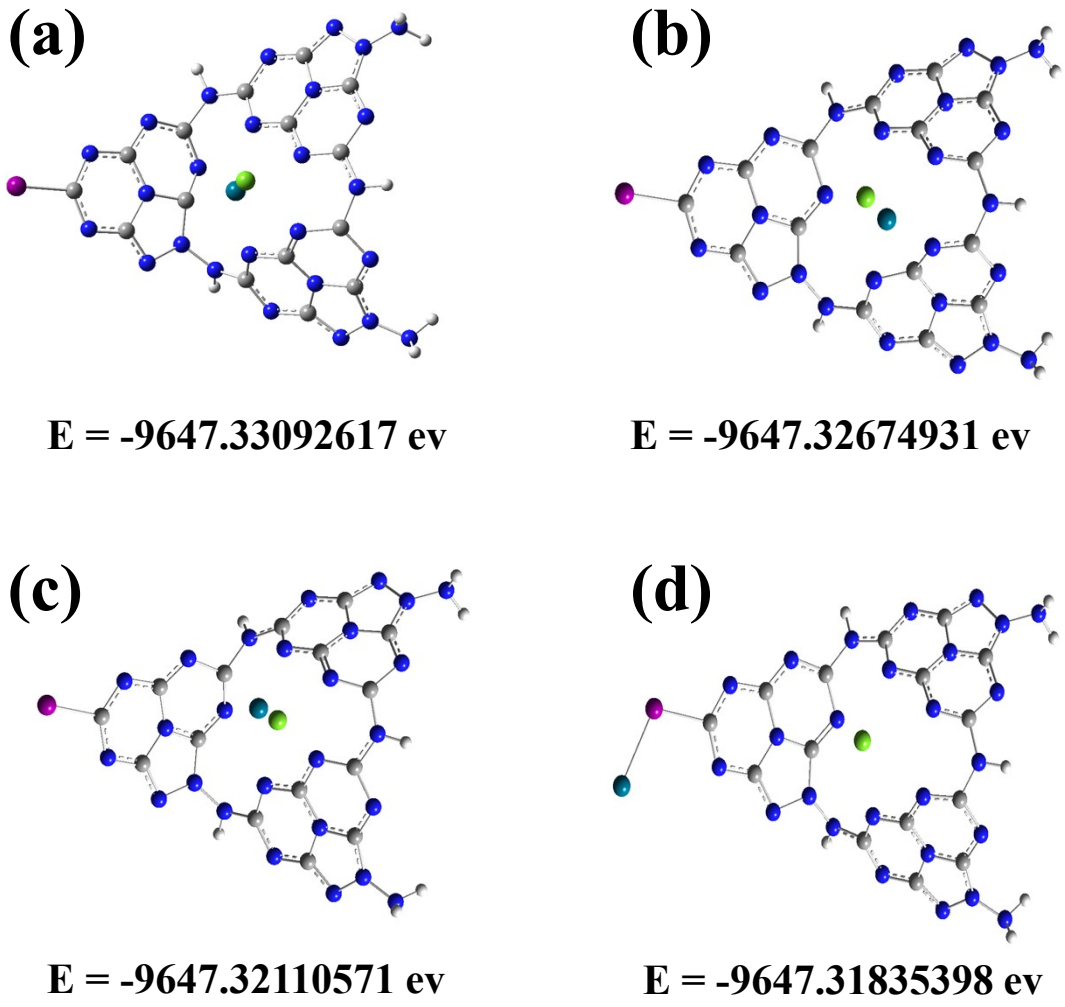

Figure S8. Structural energies of the Pd atoms at different positions of the CN. Gray, blue, white, bright green, purple and blackish green represent C, N, H, K, I and Pd, respectively.

Table S1. Specific BET surface area and pore volume of g-C_3N_5, C_3N_5-K,I and Pd/C_3N_5-K,I.

Sample	S_{BET}(m^2 g^{-1})	V_p(cm^3 g^{-1})
g-C_3N_5	**2.9438**	**0.0161**
C_3N_5-K,I	**6.1582**	**0.0277**
Pd/C_3N_5-K,I	**6.4064**	**0.0275**

Table S2. Elemental composition of 2.25% Pd/C_3N_5-K,I obtained from ICP analysis.

Catalyst	I(wt%)	Pd(wt%)	K(wt%)
2.25% Pd/C_3N_5-K,I	**1.07**	**2.25**	**0.37**

Table S3. Comparison of photocatalytic H_2 evolution of Pd/C_3N_5-K,I with literature reported g-C_3N_5-based catalysts.

Catalysts	Pt Cocatalyst	H_2 evolution rate (μmol g^{-1} h^{-1})	AQY (%)	Year	Ref.
mesoporous S-C_3N_5	3 wt%	1370	/	2024	[1]
C_3N_5/Ti_3C_2	1 wt%	2581.23	3.81 (420 nm)	2024	[2]
NiO/C_3N_5	/	112.2	5.94 (400 nm)	2024	[3]
S-C_3N_5	3 wt%	486	/	2023	[4]
C_3N_5/TiO_2	/	1833.86	1.93 (420 nm)	2023	[5]
Pt SA/C_3N_5	0.5 wt%	1776.8	0.47 (420 nm)	2023	[6]
CdS/g-C_3N_5	3 wt%	502.11	/	2023	[7]
g-C_3N_5/poly	1 wt%	2326.8	2.25 (420 nm)	2022	[8]
NH_2-UiO-66/C_3N_5	2 wt%	3936	6.78 (420 nm)	2022	[9]
C_3N_5 nanosheets	/	28.97	/	2020	[10]
Pd/C_3N_5-K,I	0.36 wt%	2878	6.07 (400 nm) 3.74 (420 nm)	This work	

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