Supporting Information

Nanoarchitectonics on Z-scheme and Mott-Schottky heterostructure for photocatalytic water oxidation via dual cascade charge transfer pathways

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1. Supplementary Figures

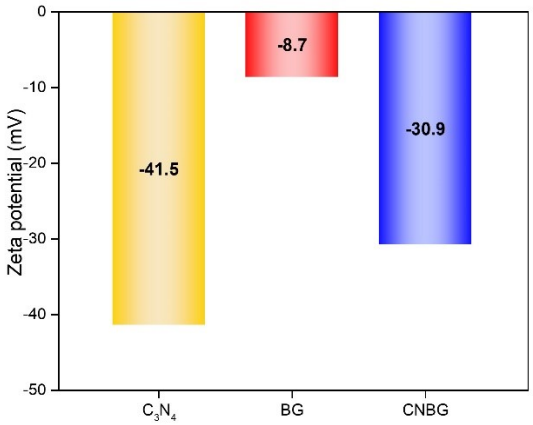

Fig. S1. Zeta potentials of the C_3N_4, BG, and CNBG.

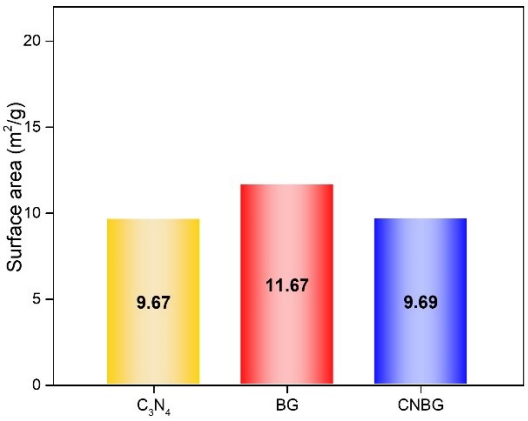

Fig. S2. Specific surface areas of the C_3N_4, BG, and CNBG.

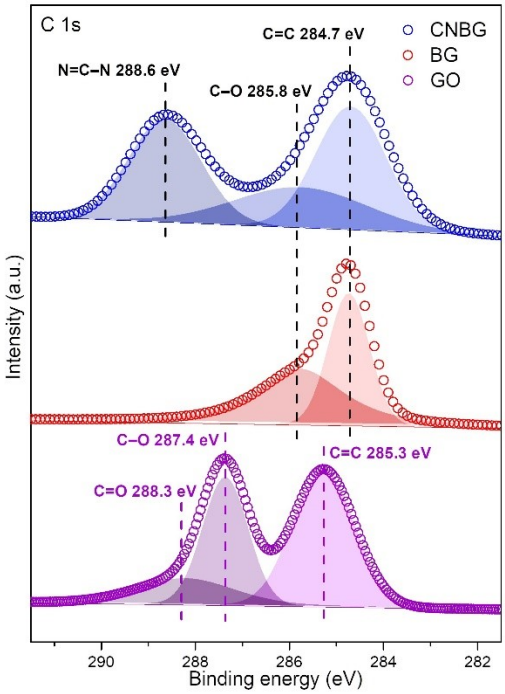

Fig. S3. High-resolution C 1s XPS spectra of the GO, BG, and CNBG.

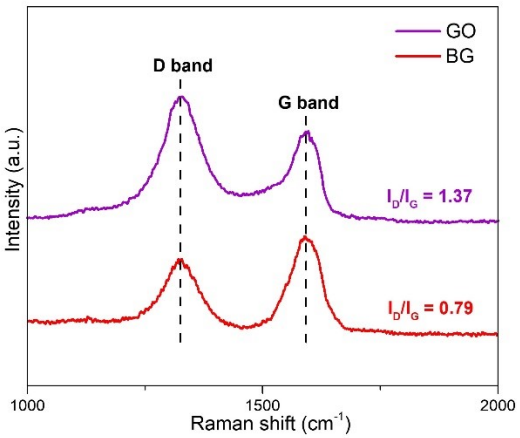

Fig. S4. Raman spectra of the GO and BG.

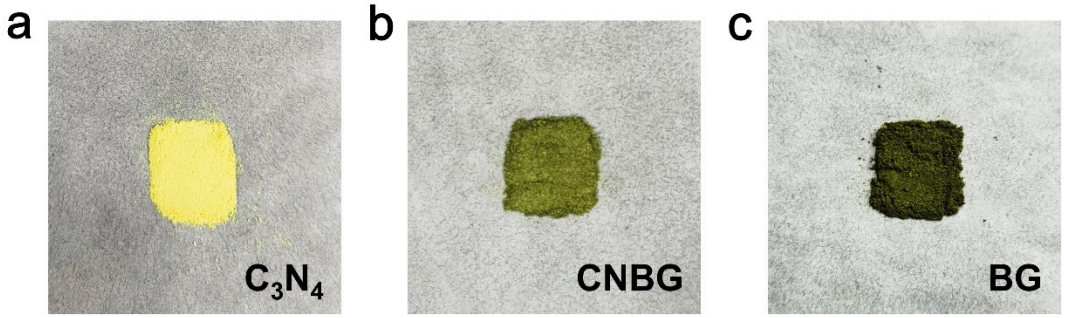

Fig. S5. Digital photographs of the a) C_3N_4, b) CNBG, and c) BG.

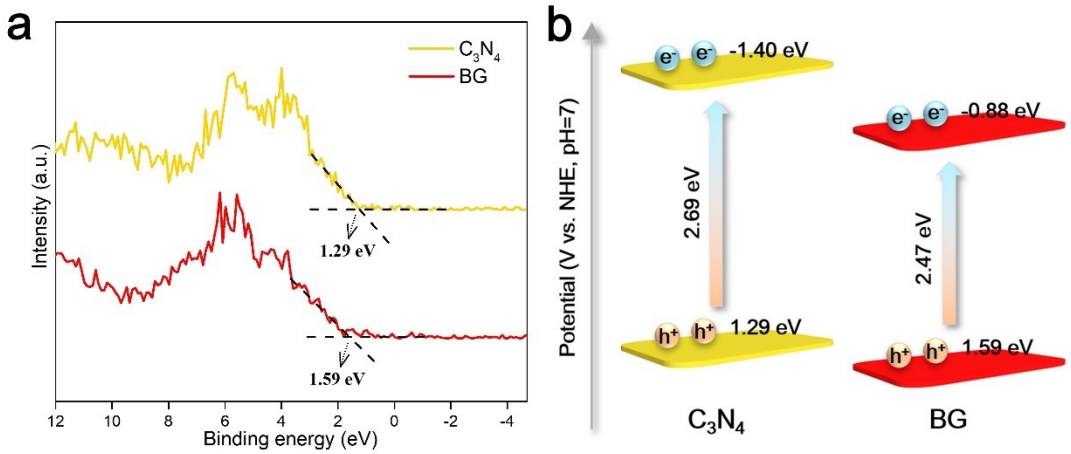

Fig. S6. a) XPS valence band spectra of the C_3N_4 and BG. Dashed lines mark baselines and tangents, the intersection value is the valence band edge. b) Energy band structure diagrams of the C_3N_4 and BG.

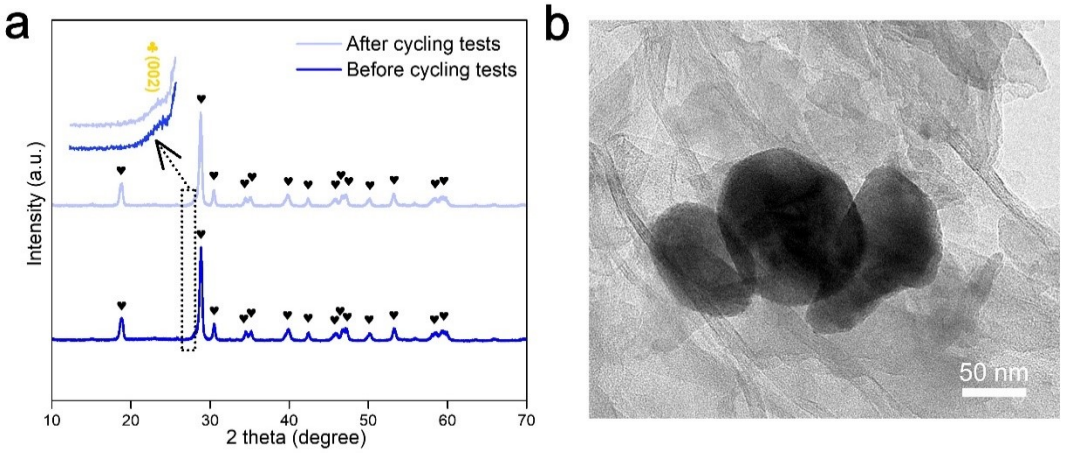

Fig. S7. Characterizations for the CNBG before or after cycling tests. a) XRD patterns. b) The TEM image after cycling tests.

2. Supplementary Tables

Table S1. Comparison of apparent quantum efficiency (AQE) of the CNBG with reported photocatalysts.

Photocatalysts	AQE (%)	References
CNBG	**26.35 (420 nm)**	**This Work**
ZrO_2/TaON/$BiVO_4$	12.3 (420 nm)	*Nature Communications.* **2022**, *13*, 484.
O_V-rich BG	23.19 (420 nm)	*ACS Applied Materials & Interfaces*. **2022**, *14*, 12180-12192.
IrO_x-am@TiO_2	7.82 (425 nm)	*ACS Catalysis.* **2020**, *10*, 8742-8750
30-facets $BiVO_4$ polyhedron	18.3 (430 nm)	*Advanced Materials.* **2018**, *30*, 1703119
Ultrapure $BiVO_4$/Graphene	19.8 (420 nm)	*Nanoscale.* **2020***, 12,* 14853-14862
$CoAl_2O_4$/g-C_3N_4	0.2 (420 nm)	*ACS Catalysis.* **2020**, *10*, 4960-4966
Au/Al_2O_3/TiO_2	1.6 (420 nm)	*Advanced Functional Materials.* **2020**, *281*, 2005688
ZnO/$BiVO_4$	5.0 (450 nm)	*Nano Energy.* **2018**, *51*, 764-773
***p*-BiOBr**	1.6 (405 nm)	*Journal of the American Chemical Society.* **2022**, *144*, 3386-3397.
$Zn_{0.2}$-PHI/PHI	3.6 (420 nm)	*ACS Catalysis.* **2021**, *11*, 13463-13471

Table S2. Time-resolved PL decay curves were fitted by a biexponential function to calculate the fluorescence lifetime for the C_3N_4, BG, and CNBG.

Samples	τ_1 (ns)	A_1	τ_2 (ns)	A_2	τ_{av} (ns)	χ^2
C_3N_4	0.87	1297.41	5.16	93.85	2.16	0.99
BG	0.88	774.42	6.11	353.62	4.86	0.99
CNBG	1.11	1122.03	13.17	21.89	3.38	0.99