Electronic Supplementary Material (ESI) for Catalysis Science & Technology.

Effects of different treatment atmospheres on CeO_2/g-C_3N_4 photocatalytic CO_2 reduction: good or bad?

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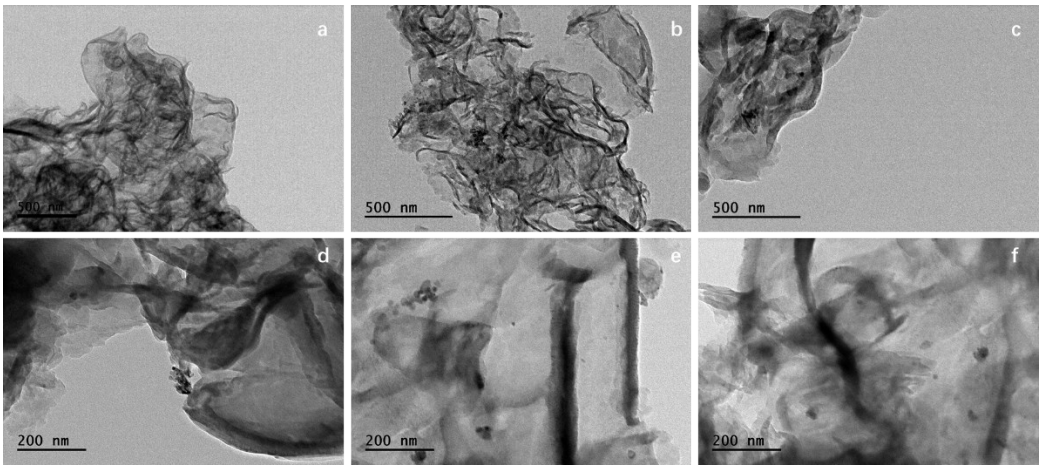

Fig. S1 TEM images of (a, d) CeCN, (b, e) CeCN-N_2 and (c, f) CeCN-H_2.

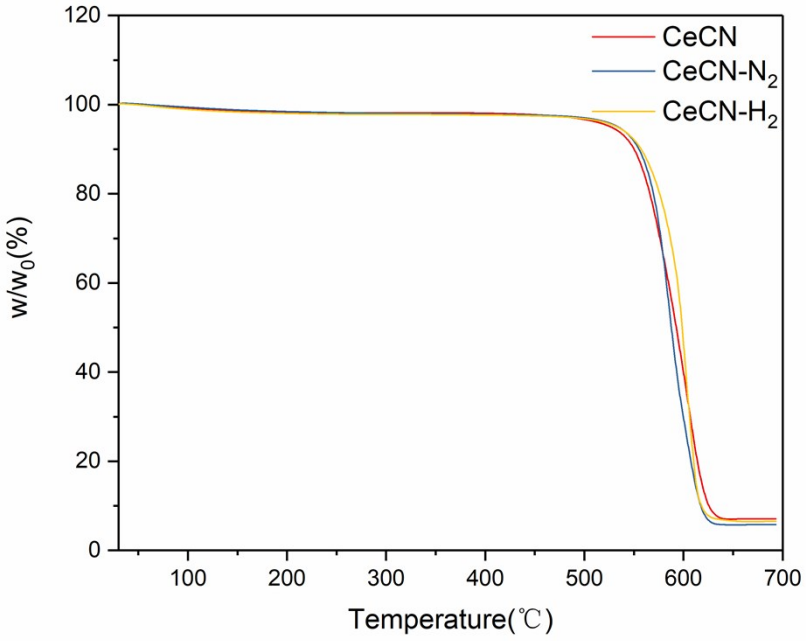

Fig. S2 TG-DTA results of CeO_2/g-C_3N_4 samples.

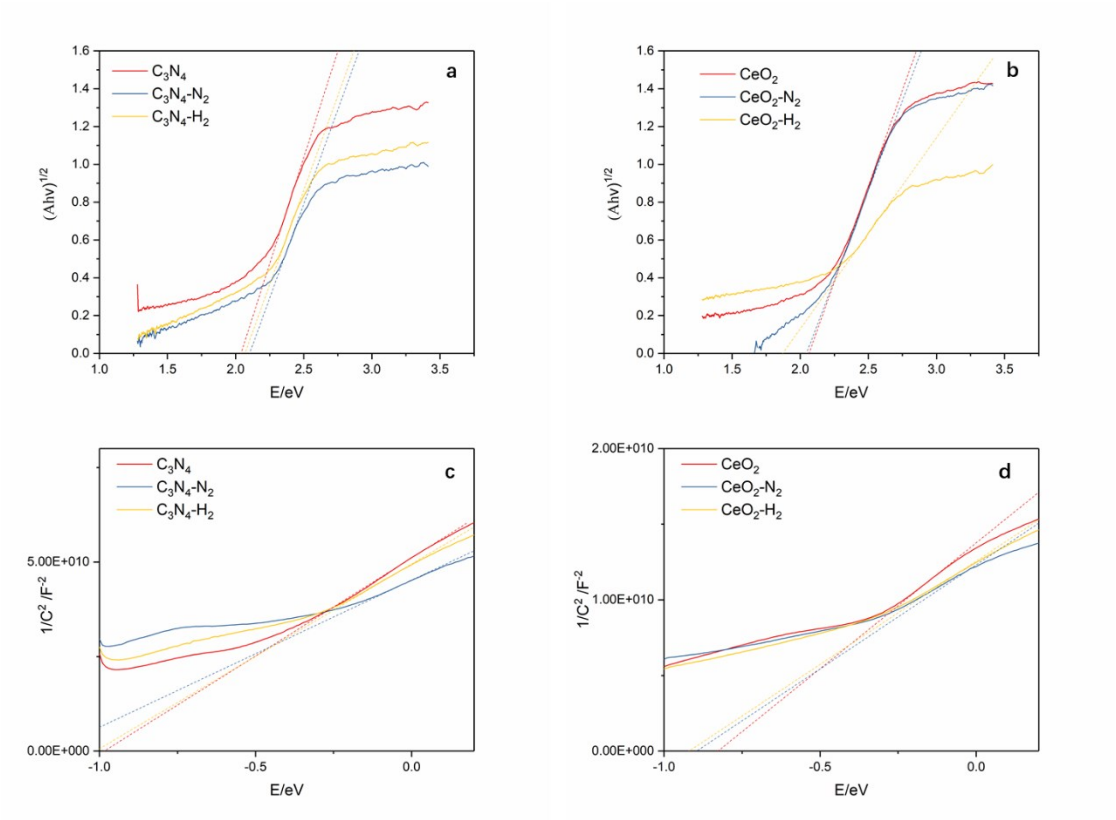

Fig. S3 Plot of $(Ahv)^{1/2}$ versus photon energy of (a). g-C_3N_4 and (b). CeO_2 samples and the Mott-Schottky plots of (c). g-C_3N_4 and (d). CeO_2 samples.

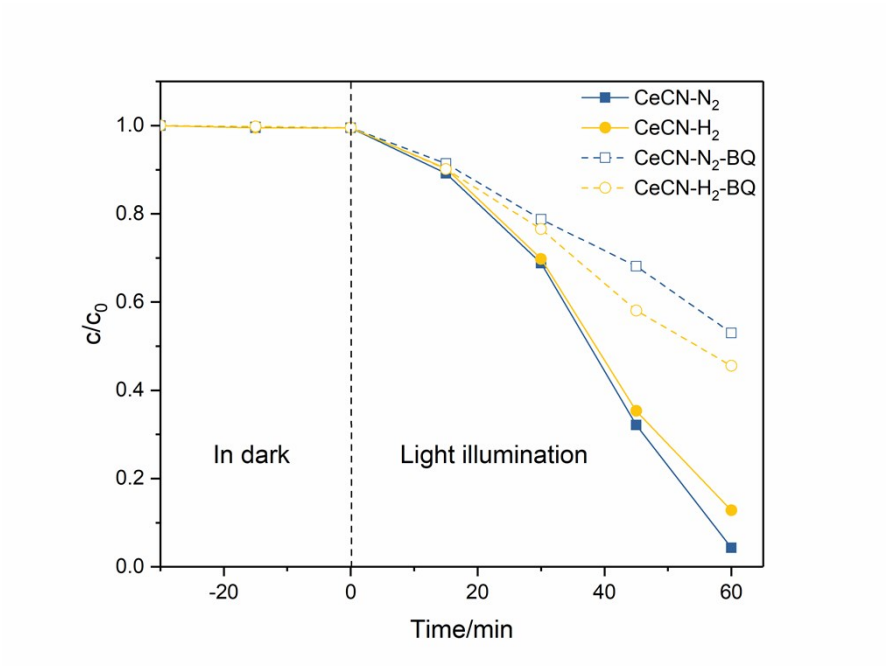

Fig. S4 The activities of MB degradation of CeO_2/g-C_3N_4 samples.

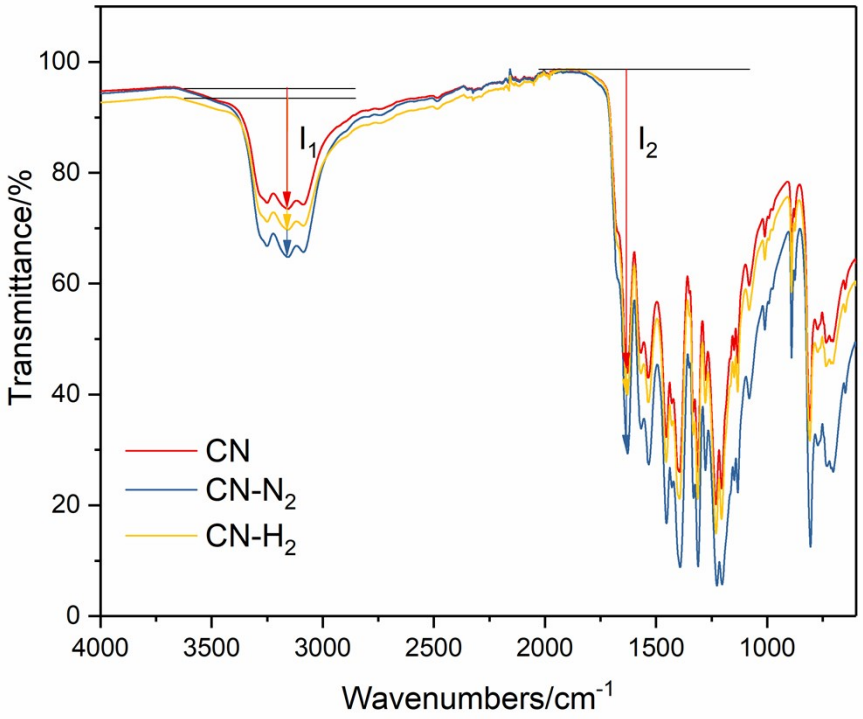

Fig. S5 FT-IR spectra of g-C_3N_4 under different atmosphere treatment.

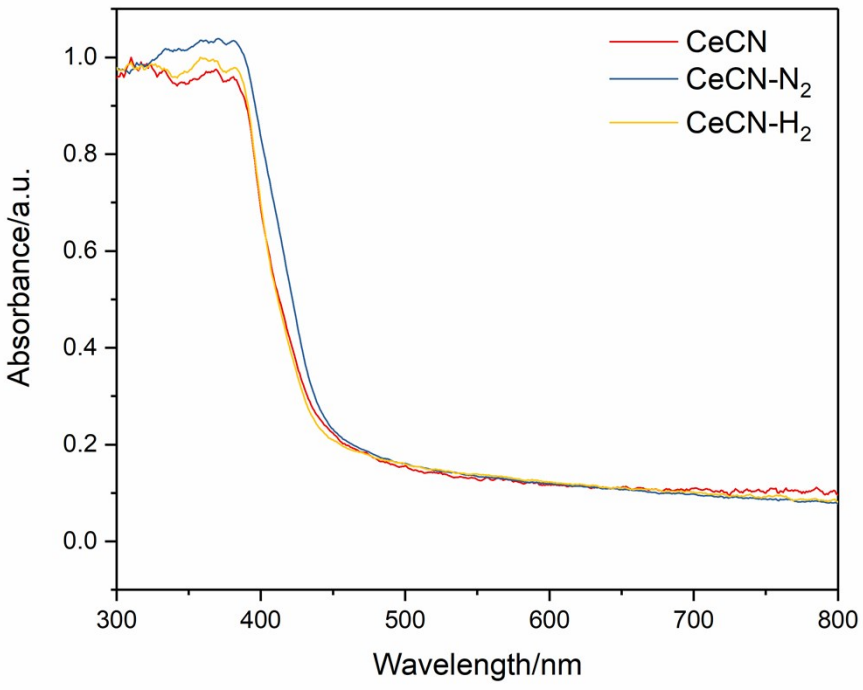

Fig. S6 UV-vis absorption spectra of CeO_2/g-C_3N_4 samples.

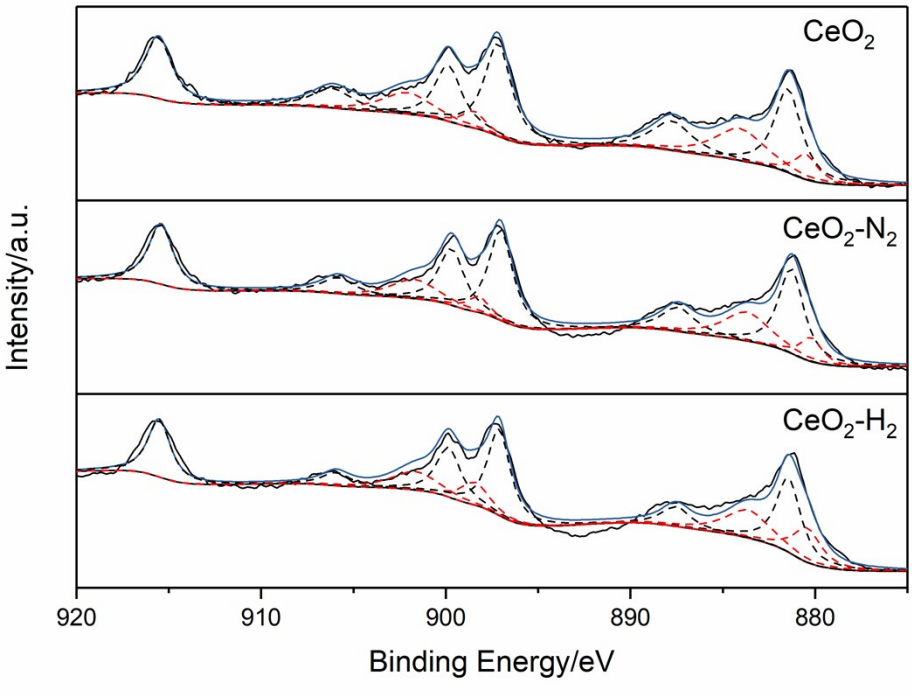

Fig. S7 XPS spectra of Ce 3d of CeO_2 samples.

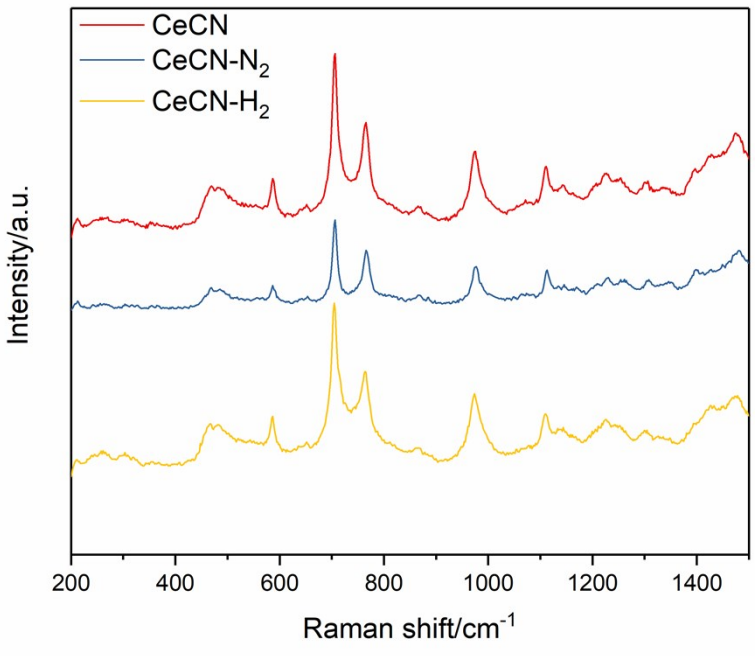

Fig. S8 The Raman spectra of the CeO_2/g-C_3N_4 samples.

Table. S1 The calculated Eg, E_{VB} and E_{CB} of CeO_2 and g-C_3N_4 samples.

	E_{CB}/V	Eg/eV	E_{VB}/V
C_3N_4	-0.54	2.04	1.5
C_3N_4-N_2	-0.72	2.10	1.38
C_3N_4-H_2	-0.57	2.07	1.5
CeO_2	-0.39	2.07	1.68
CeO_2-N_2	-0.46	2.05	1.59
CeO_2-H_2	-0.48	1.87	1.39

Table. S2 The peak intensity of FT-IR peaks.

	I_1	I_2
CN	21.7	54.6
CN-N_2	30.3	69.2
CN-H_2	23.9	58.6

Table. S3 The peak information of Ce 3d XPS spectra of CeO_2 samples

Ce 3d	Band energy/ eV	area/a.u.		
		CeO_2	CeO_2-N_2	CeO_2-H_2
u'''	915.6	9757.939	12136.29	9642.786
u''	906.3	4655.48	4505.709	2813.985
u'	899.9	8841.333	12010.03	9034.751
u	902.3	4277.602	7331.5	6169.455
u_0	898.6	2348.729	2886.38	4742.972
v'''	897.2	14636.91	18204.43	14464.18
v''	887.9	6983.22	6758.563	4220.978
v'	881.5	13262	18015.04	13552.13
v	884.3	9416.403	10997.25	8254.182
v_0	880.6	3523.094	4329.57	7114.458

The XPS spectra of CeO_2 after different atmospheres treatments were shown in Fig. S6, Ce 3d spectra consisted of two multiplets assigned to $3d_{3/2}$ and $3d_{5/2}$, respectively. The band was fitted into ten peaks, which were labelled as u, u_0, v and v_0 ascribed to Ce^{3+} and the other six peaks were Ce^{4+} species, respectively. The information of each peak were listed in Table. S2 and the ratios of Ce^{3+}/Ce^{4+} were calculated, in the order of CeO_2 (0.34) < CeO_2-N_2 (0.37) < CeO_2-H_2 (0.49).