

Supplementary Materials

Ce-NiO catalyst for efficient catalytic decomposition of ozone in high humidity environments

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Table S3 (B) Desorption activation energy E_d of H₂O of chemically adsorbed H₂O

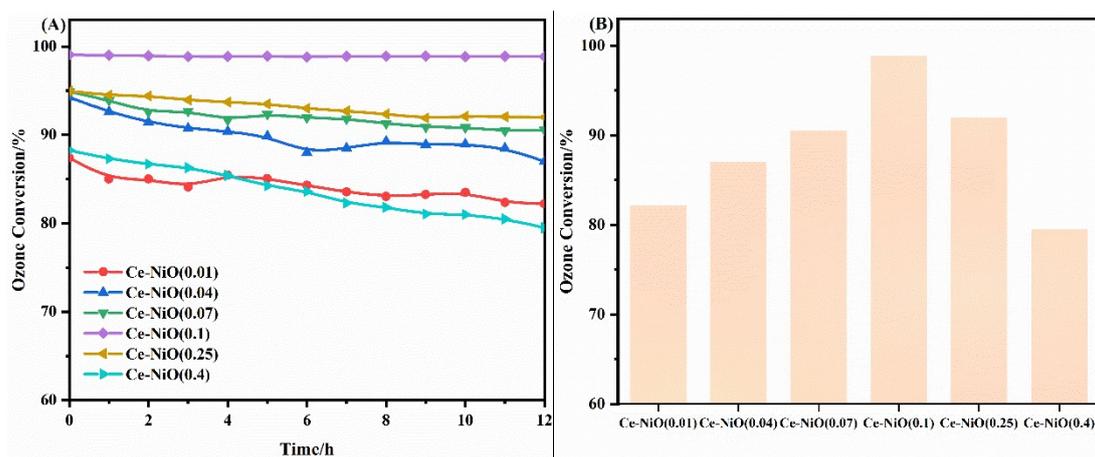


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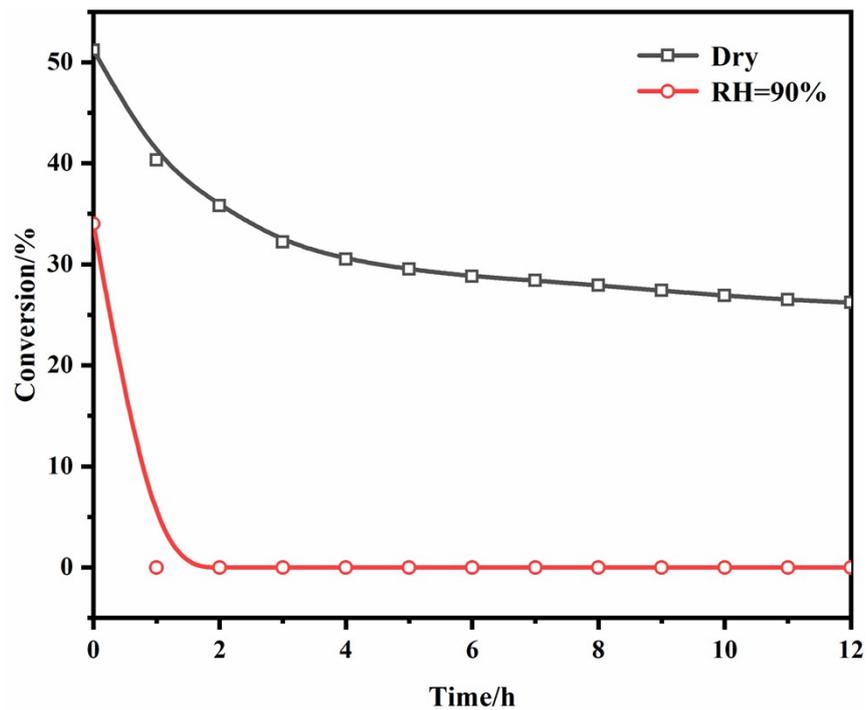


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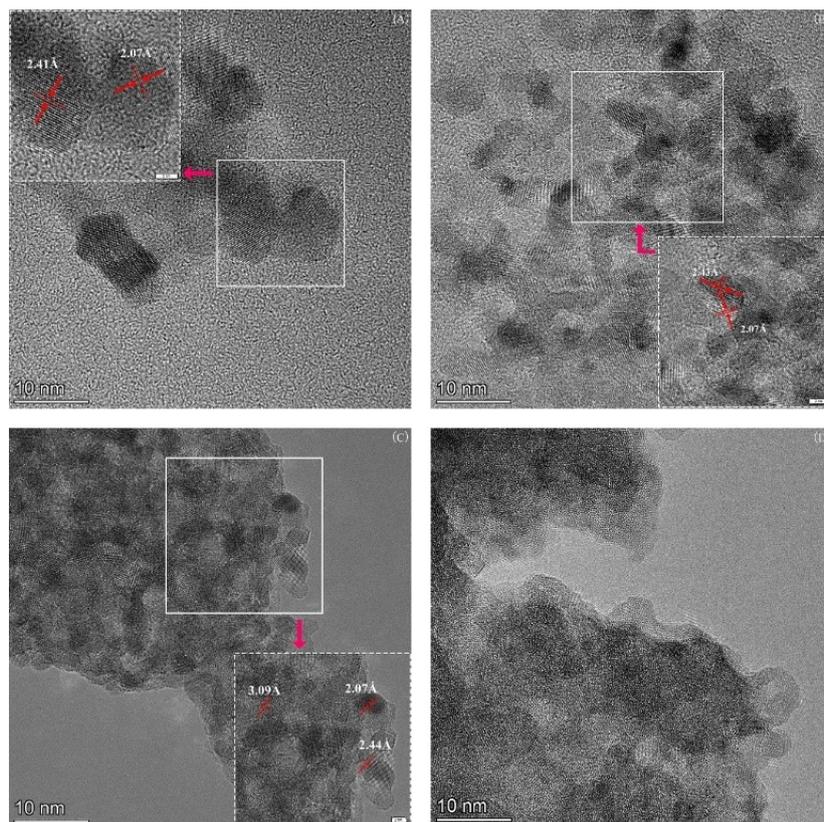


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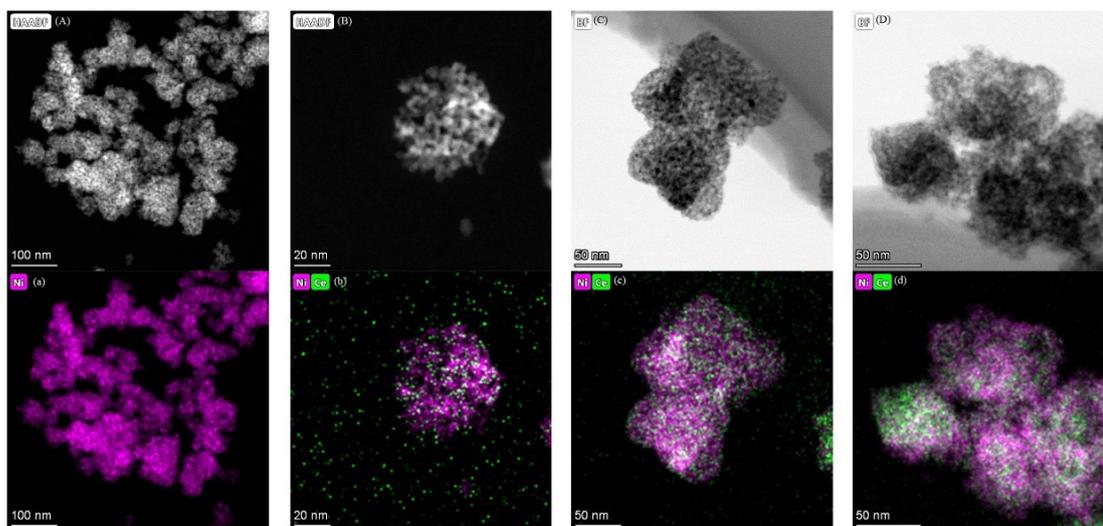


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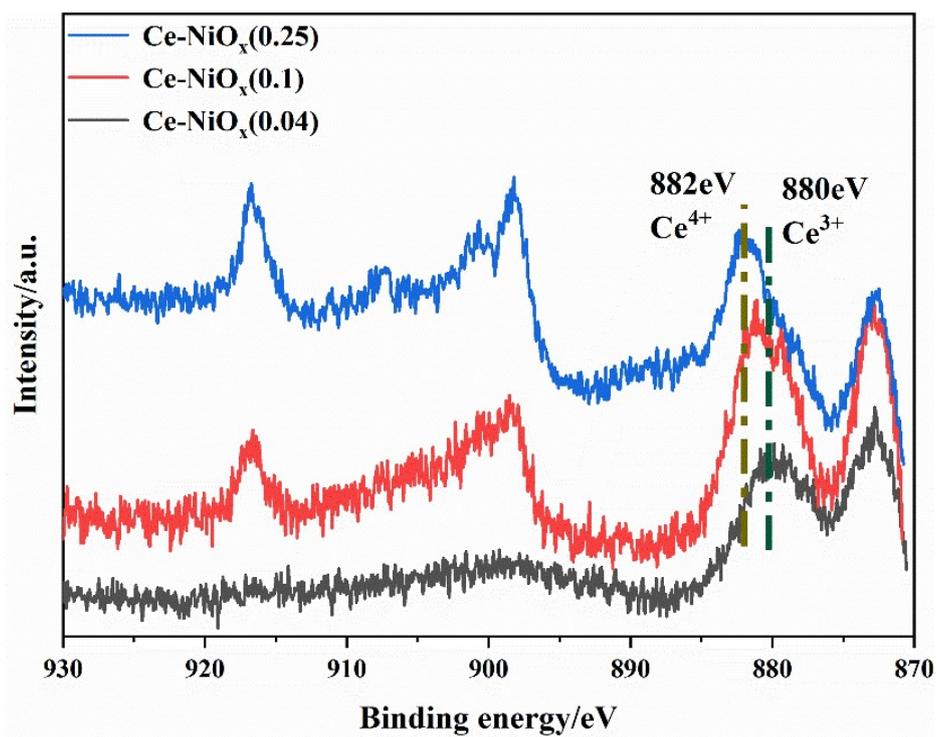


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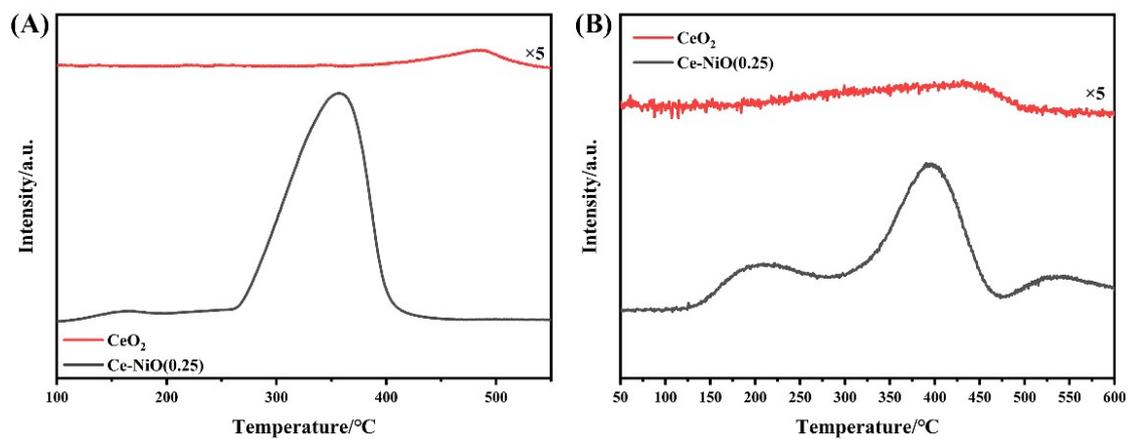


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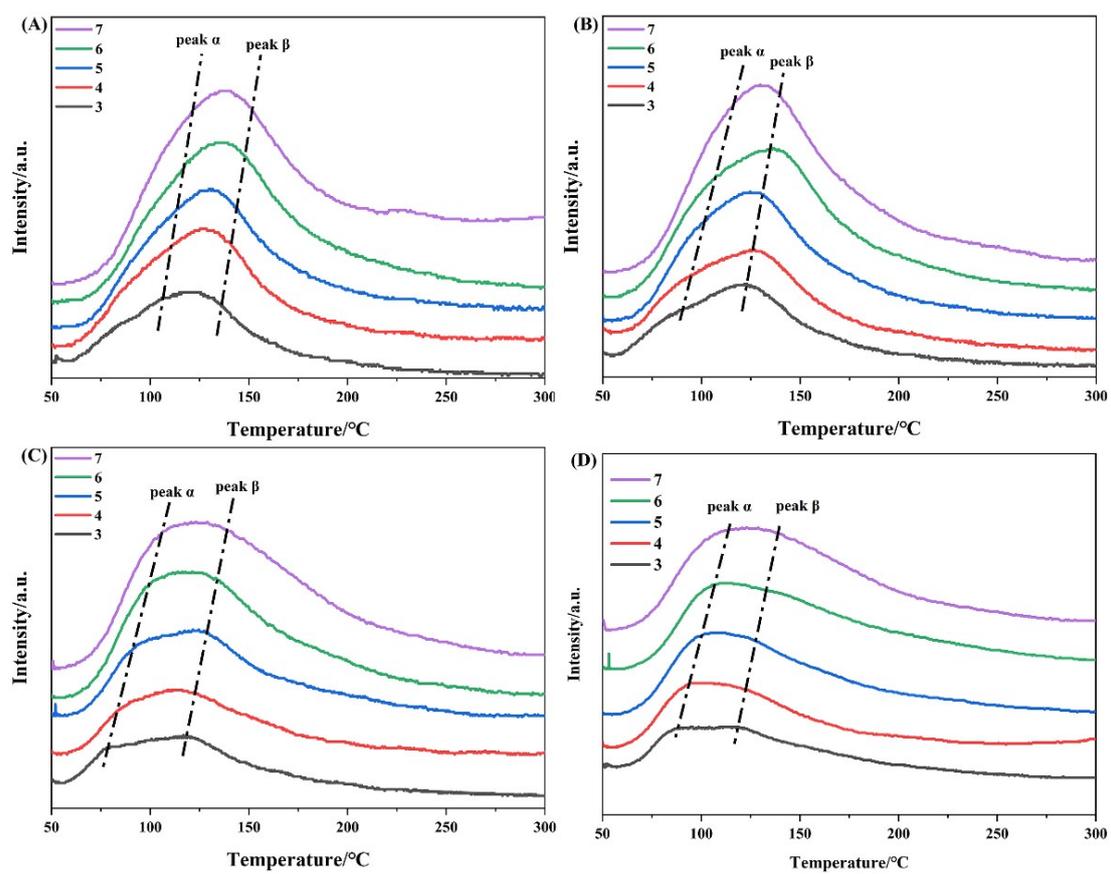


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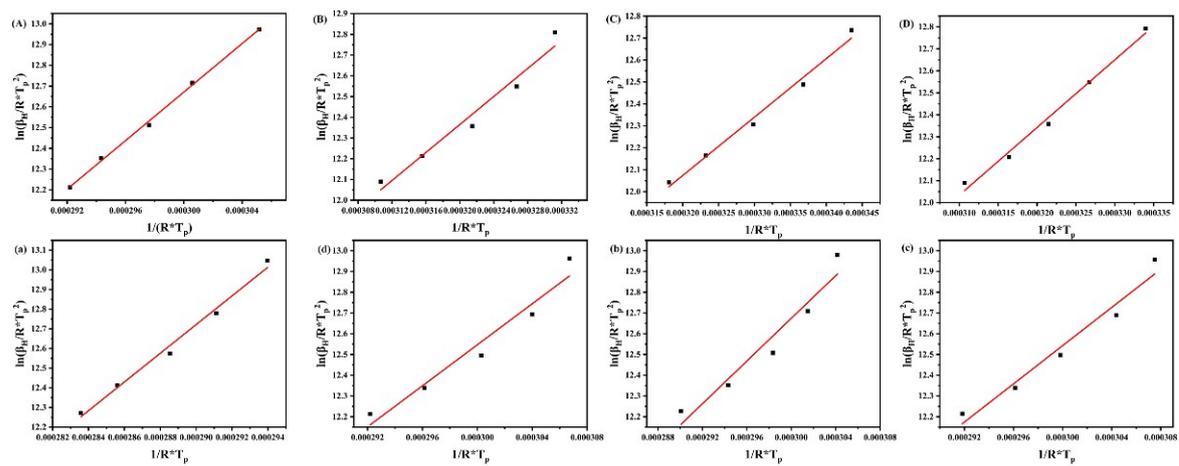


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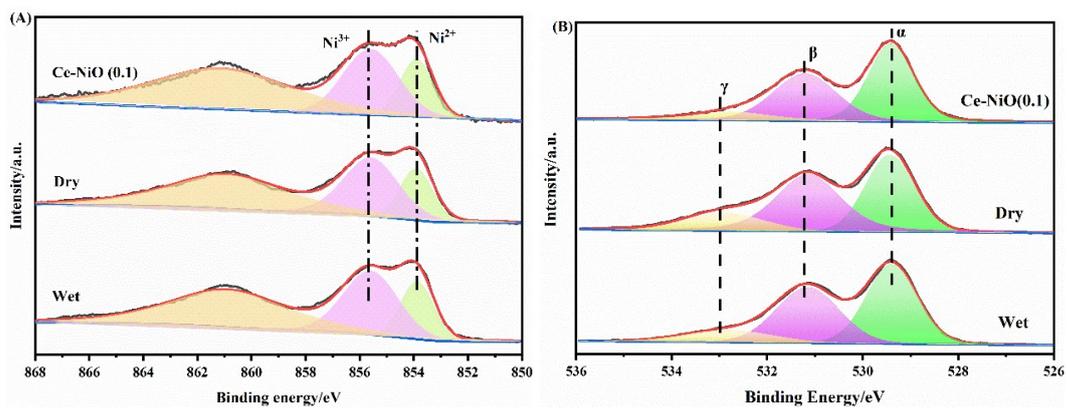


Figure S9. XPS spectra of (A) Ni 2p and (B) O 1s of Ce-NiO (0.1) after used.

Table S1. Summary of recently reported the results about ozone decomposition.

	C_{ozone} (ppm)	T (°C)	RH (%)	WHSV (mL/(g·h))	Conversion- (Time) (%)	Refer ences	mmol· g ⁻¹ ·h ⁻¹
MnCO ₃ /Mn ₃ O ₄ -1/2	20	25	95	1,200,0 00	75-(24h)	1	0.8
NiFe-LDH- CO ₃ ²⁻	40	30	65	840,00 0	80-(6h)	2	1.2
δ-MnO ₂	40	25	75	900,00 0	87-(48h)	3	1.4
2%K- 2%Ag/MnO ₂	40	30	65	1,680,0 00	83-(60h)	4	2.49
MnO ₂ -in- CNT	50	25	70	600,00 0	77-(50h)	5	1.03
δ-MnO ₂ /AC	40	25	50	600,00 0	100-(24h)	6	1.07
Co ₃ O ₄	100	25	90	1,200,0 00	80-(10h)	7	4.3
Ni/NiO	100	25	90	240,00 0	100-(8h)	8	10.7
Ce-NiO (0.1)	200	30	90	1,200,0 00	98-(60h)	This Work	10.5

Table S2. Surface H₂O species ratios of NiO and Ce-NiO catalysts from H₂O-TPD.

Catalyst	H ₂ O		
	α (%)	β (%)	γ (%)
NiO	20.5	61.2	18.3
Ce-NiO (0.04)	21.1	52.8	26.1
Ce-NiO (0.1)	24.6	44.8	30.6
Ce-NiO (0.25)	29.1	43.3	27.7

Table S3 (A) Desorption activation energy E_d of H_2O of α -physically adsorbed H_2O .

Catalyst	The peak temperature T_p of peak α curves at different heating rates (K)					Desorption activation energy E_d (kJ/mol)
	3°C/min	4°C/min	5°C/min	6°C/min	7°C/min	
NiO	379.06	383.52	386.65	390.21	394.54	58.5
Ce-NiO (0.04)	363.78	367.87	374.12	380.20	388.96	36.7
Ce-NiO (0.1)	351.41	356.16	364.03	372.22	378.75	26.6
Ce-NiO (0.25)	361.44	367.61	373.57	380.67	386.94	32.5

Table S3 (B) Desorption activation energy E_d of H_2O of β -chemically adsorbed H_2O .

Catalyst	The peak temperature T_p of peak β curves at different heating rates (K)					Desorption activation energy E_d (kJ/mol)
	3°C/min	4°C/min	5°C/min	6°C/min	7°C/min	
NiO	409.02	414.15	416.64	421.15	425.05	72.9
Ce-NiO (0.04)	395.80	399.17	403.89	408.60	412.65	54.5
Ce-NiO (0.1)	391.30	395.65	401.92	406.84	412.25	45.9
Ce-NiO (0.25)	392.12	395.91	400.57	405.70	411.71	53.3

Table S4. Ni 2p and O 1s ratios of the Ce-NiO (0.1) catalysts from XPS results.

Catalyst	Ni (%)			O (%)			
	Ni ²⁺	Ni ³⁺	Ni ³⁺ /Ni ²⁺	O _α	O _β	O _γ	O _β /O _α
Ce-NiO (0.1)	34.3	65.7	1.91	47.9	40.9	11.2	0.85
Ce-NiO (0.1)-Dry	32.9	67.1	2.04	39.6	46.1	14.3	1.16
Ce-NiO (0.1)-Wet	34.3	65.7	1.91	47.1	40.2	12.7	0.85

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