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Engineering the Interface and Interaction Structure on Highly Coke-Resistant Ni/CeO_2-Al_2O_3 Catalyst for Dry Reforming of Methane

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Table S1. Textural Properties of NiO/Al_2O_3 and NiO/CeO_2-Al_2O_3

Catalyst	S_{BET} ($m^2 \cdot g^{-1}$)	V_p ($cm^3 \cdot g^{-1}$)	D_p (nm)
NiO/Al_2O_3	171	0.7	16.3
NiO/CeO_2-Al_2O_3	197	0.8	16.1

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Table S2. Results of H_2 Chemisorption for Ni/Al_2O_3 and Ni/CeO_2-Al_2O_3

Catalyst	$H_{2\ uptake}$ (m^3/g)	Dispersion (%)	S_{Ni} (m^2/g)	d_{Ni} (nm)
Ni/Al_2O_3	1.10	6.5	54.8	7.7
Ni/CeO_2-Al_2O_3	1.13	6.5	55.0	6.5

Table S3. Comparison of CH_4 and CO_2 Conversions as Well as Coke Deposition Rate with Other Catalysts in DRM

Catalysts	Temperature (°C)	GHSV (mL g_{cat}^{-1} h^{-1})	Ratio of feed gases	CH_4 conversion (%)	CO_2 conversion (%)	Stability (h)	Coke deposition rate (mg$_c$ g_{cat}^{-1} h^{-1})[a]	Ref.
Ni/CeO_2-Al_2O_3	500	24,000	CH_4/CO_2 = 1/1	12	16	50	0.42	This work
$NiFe/Al_2O_3$	450	12,000	CH_4/CO_2 = 1/1	9.6	14	20	1.18	1
$Pt^{0.25}$-$NiCe@SiO_2$	500	60,000	$CH_4/CO_2/N_2$ = 1/1/1	~6.5	~11.5	20	1.81	2
Ni-Co/La_2O_3	650	119,000	$CH_4/CO_2/N_2$ = 45/45/10	30	40	10	100	3
0.3PdNi/MCM-41	550	120,000	$CH_4/CO_2/N_2$ = 1/1/3	38	52	12	156.8	4
NMG-600	600	54,000	$CH_4/CO_2/N_2$ = 1/1/1	48	52	12	1.44	5
1Ni2Co/ZSM5	700	60,000	CH_4/CO_2/Ar = 1/1/3	69	60	12	28.69	6
0.5Ru@Ni-MCM-41	600	36,000	CH_4/CO_2/Ar = 1/1/1	35	38	4	485.29	7
Ni-$Ce_{1-x}Zr_xO_2$_cp	600	60,000	CH_4/CO_2/Ar = 1/1/8	55	70	24	684	8
75Ni25Co-Al-5Ca	600	7,000	$CH_4/CO_2/N_2$ = 1/1/3	19	57	3.5	37.7	9
Ni@SBA-15-EG	750	7,500	CH_4/CO_2 = 1/1	45	35	20	1.975	10

a carbon deposition rate: $R_c = \frac{m_C}{m_{cat} \cdot \text{time (h)}}$, where m_C and m_{cat} represent the amounts of carbon on the spent catalyst and the mass of catalyst, respectively.

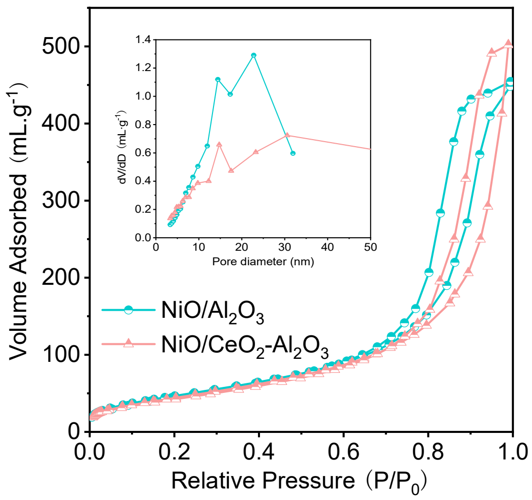

Figure S1. N_2 isotherms of fresh NiO/Al_2O_3 and NiO/CeO_2-Al_2O_3.

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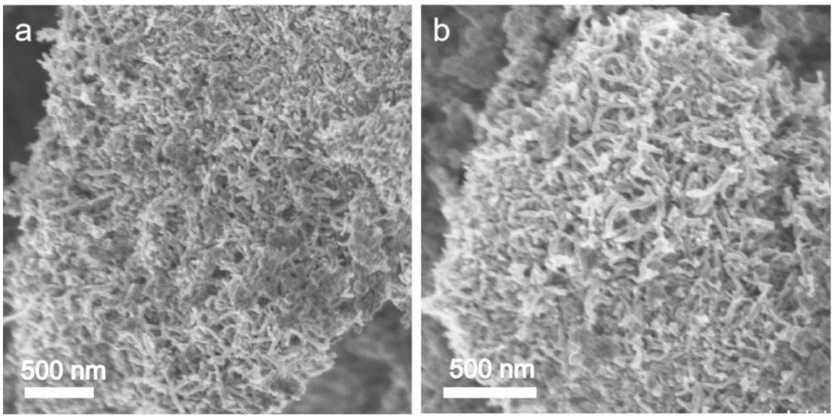

Figure S2. SEM images of the control $NiO/CeO_2-Al_2O_3$ catalyst after stability test.

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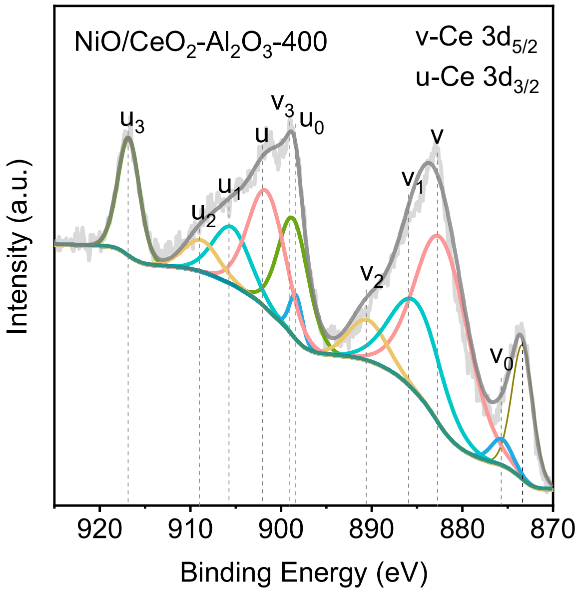

Figure S3. Ce 3d XPS spectra of the control $NiO/CeO_2-Al_2O_3$ catalyst.

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