

Supporting Information

Probing the Enhanced Catalytic Activity of Carbon Nanotubes

Supported Ni-LaO_x Hybrids for CO₂ Reduction Reaction

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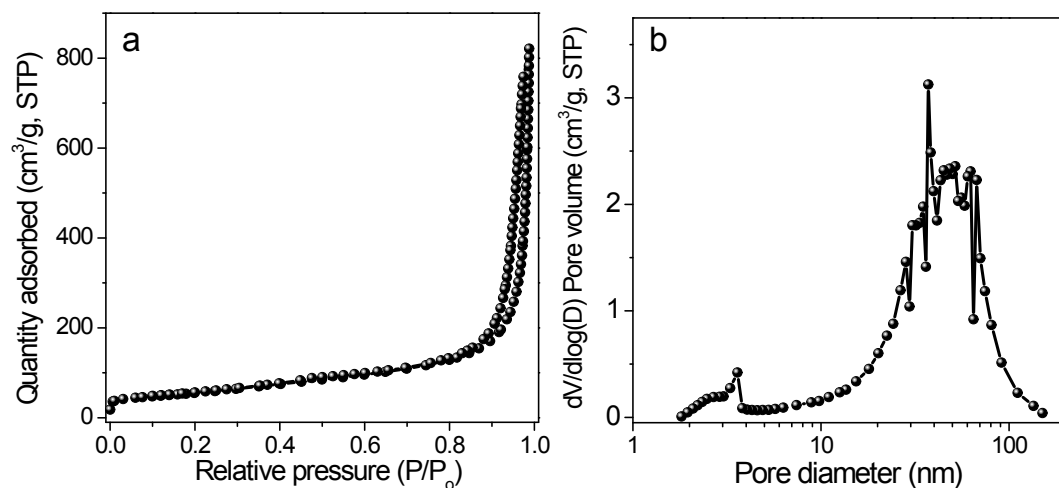


Figure S1. N₂ adsorption-desorption isotherms and pore size distributions of initial oCNT.

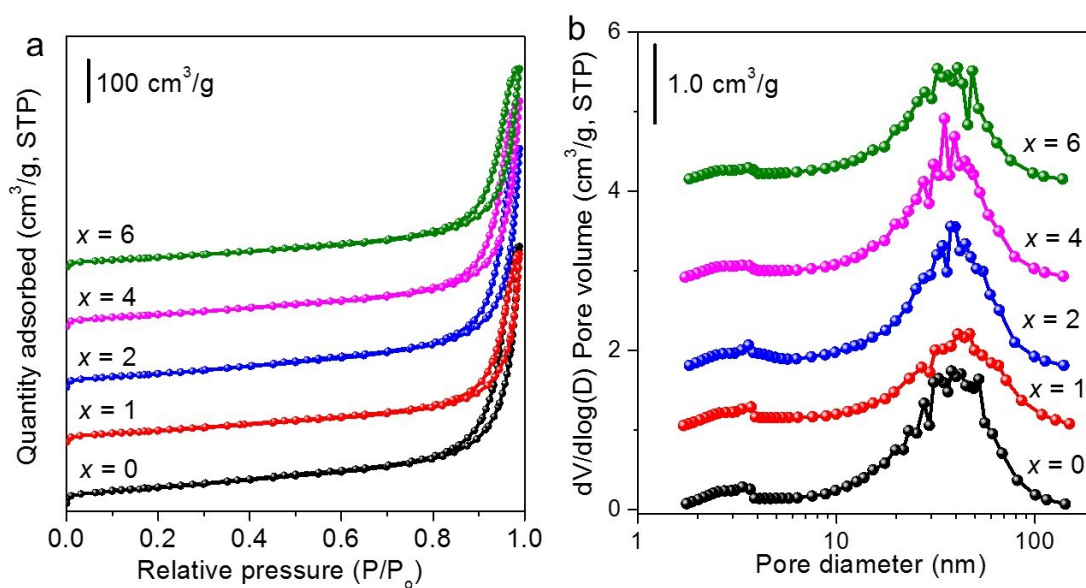


Figure S2. N₂ adsorption-desorption isotherms and pore size distributions of as-prepared Ni-xLa/oCNT samples ($x = 0, 1, 2, 4$ and 6).

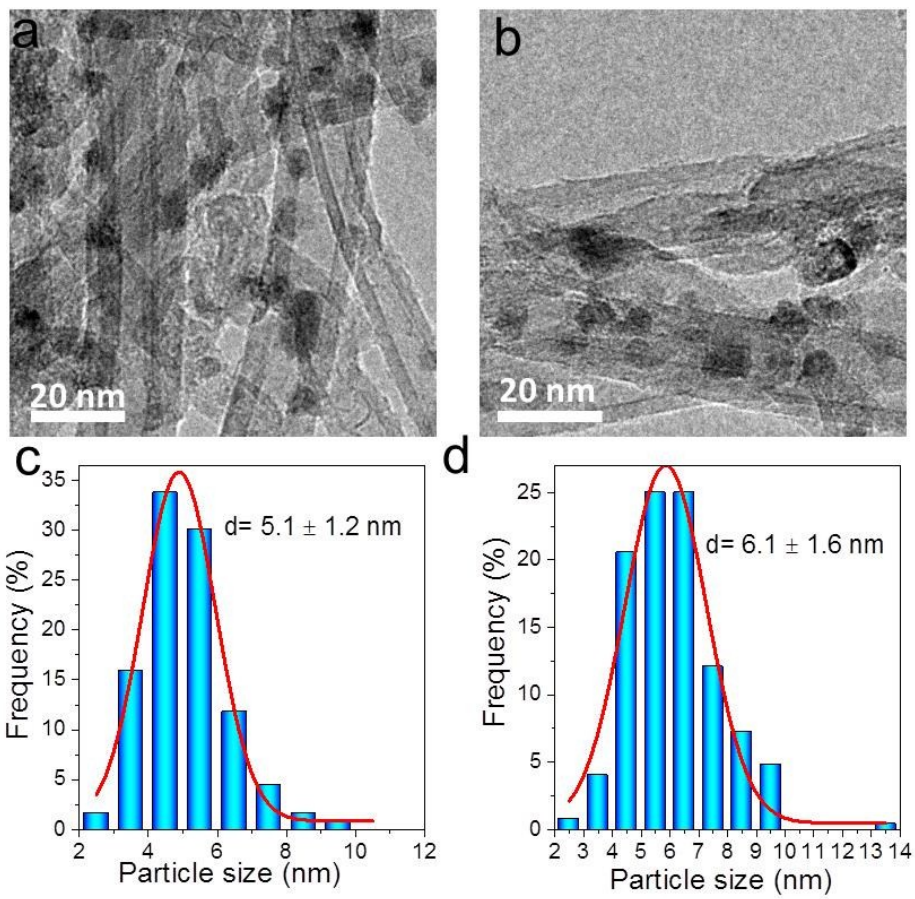


Figure S3. TEM images and particle size distribution histograms for reduced 10Ni- x La/oCNT (a, c) $x=1$, (b, d) $x=4$

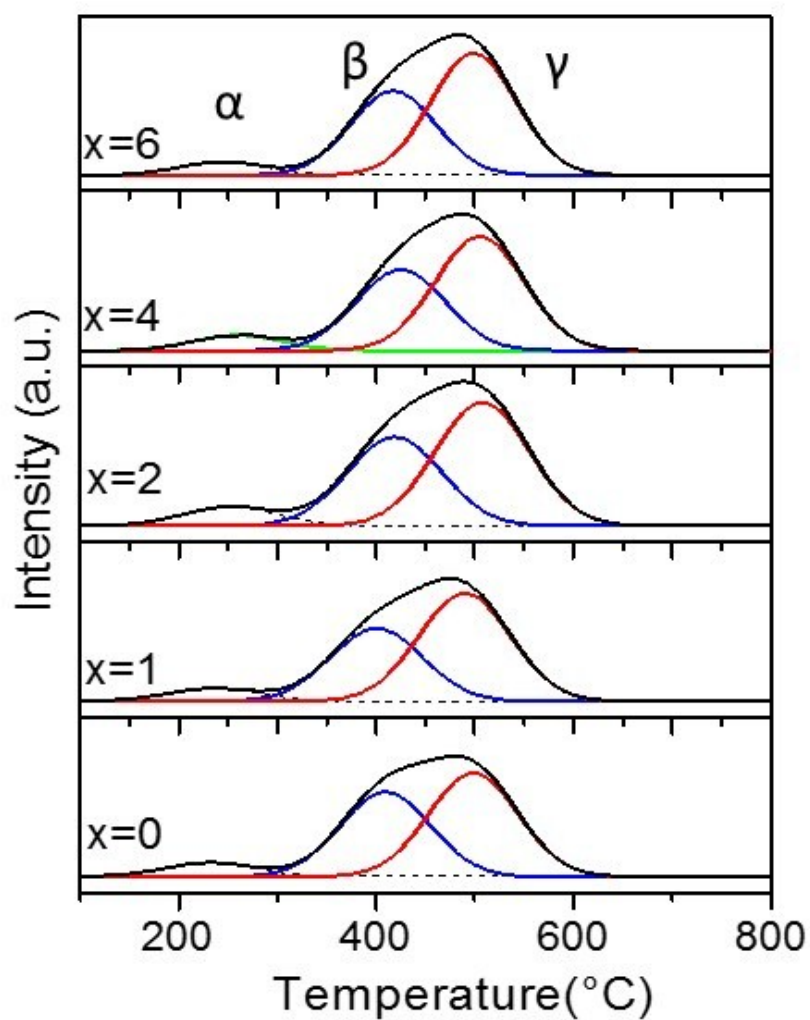


Figure S4. H₂-TPR profiles of 10Ni-xLa/oCNTs catalysts

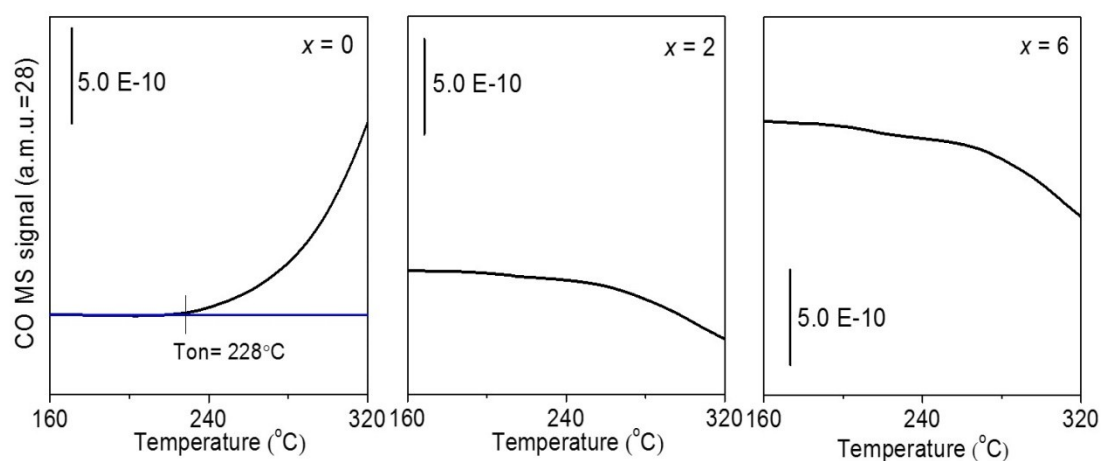


Figure S5. TPSR profiles of 10Ni-xLa/oCNTs catalysts ($x=0, 2, 6$)

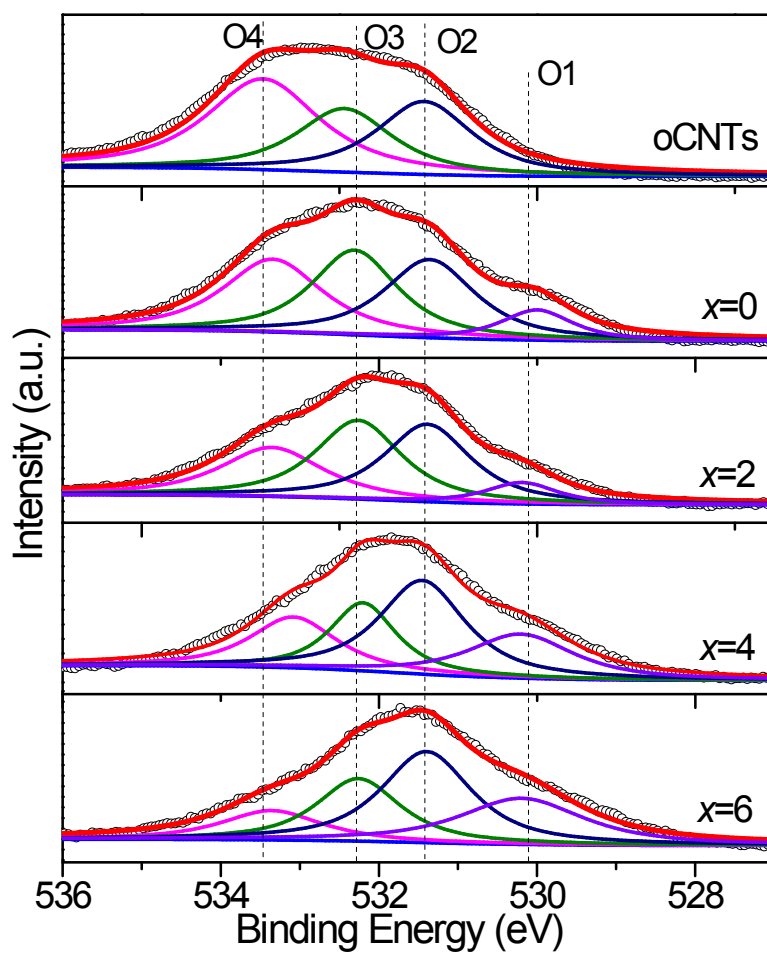


Figure S6. The O1S XPS spectra of tested samples. O1, lattice oxygen in the metal oxides; O2, C=O; O3, O-C=O; O4, C-O

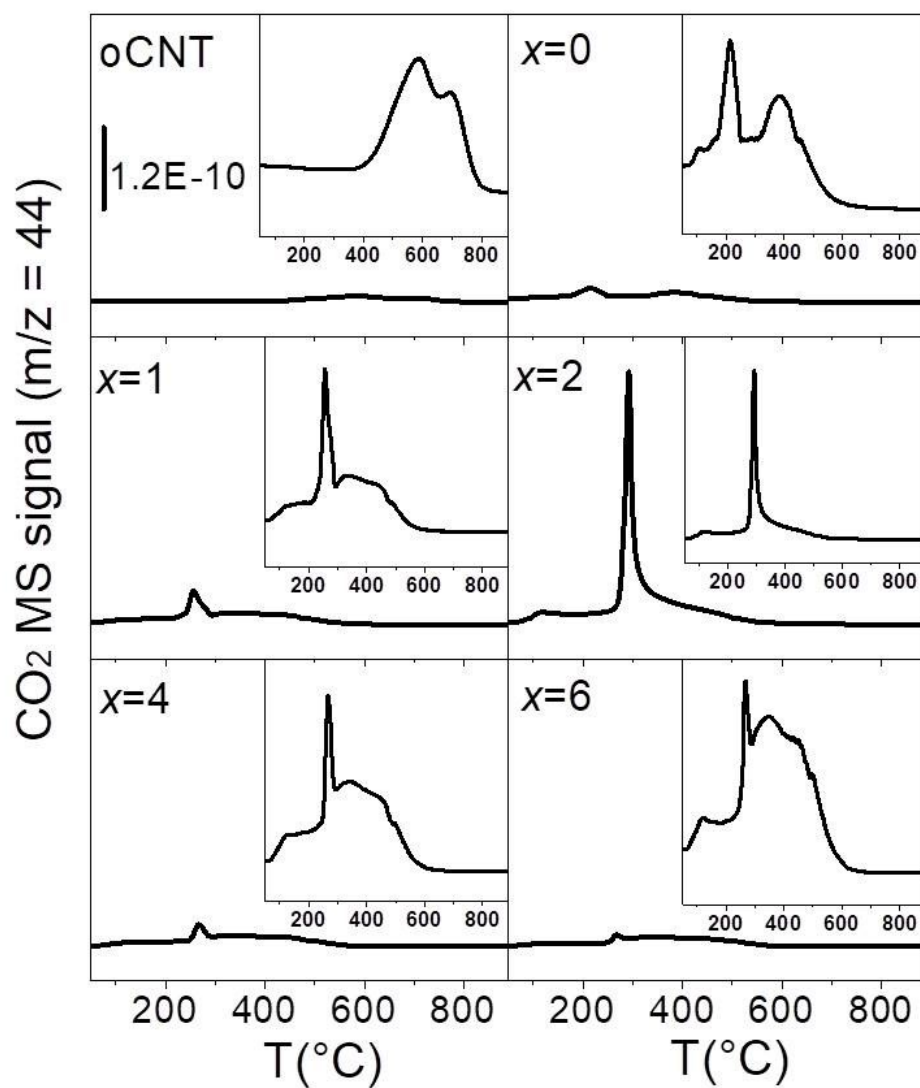


Figure S7. CO₂-TPD profiles of the initial support and 10Ni-xLa/oCNT catalysts ($x=0, 1, 2, 4, 6$). The enlarged graph is shown as the inset.

Table S1. Textural properties of oCNT support.

Sample	S _{BET} (m ² /g)	Pore volume (cm ³ /g)	Pore diameter (nm)
oCNT	200	1.27	21.9

Table S2. Fitting analysis and parameters of H₂-TPR patterns of 10Ni-*x*La/oCNT catalysts.

Sample	Reduction temperature (°C)			Relative content (%)		
	α	β	γ	α	β	γ
x=0	234	400	499	6.96	41.87	51.17
x=1	238	403	490	7.13	37.41	55.46
x=2	256	423	508	8.25	38.39	53.36
x=4	254	421	502	7.28	38.46	54.27
x=6	249	419	498	6.15	38.38	55.47

α , the reduction of NiO that weakly interacted or even separated from the oCNT surface; β , the reduction of NiO well interacted with the oCNT surface; γ , the gasification of graphite.

Table S3 The relative content of O1s spectra and O/C ratio for oCNT and reduced 10Ni-*x*La/oCNT catalyst (*x*= 0, 2, 4, 6).

Sample	Relative content (%)				O/C ratio (%)				Total O/C ratio (*100)
	O1	O2 (C=O)	O3 (O-C=O)	O4 (C-O)	O1	O2	O3	O4	
oCNT	0	43.7	26.3	30.0	0	1.3	1.1	1.8	4.2
x=0	9.1	30.0	30.5	30.4	0.5	1.6	1.6	1.6	4.7
x=2	7.7	33.3	33.8	25.2	0.4	1.7	1.7	1.3	5.1
x=4	21.6	37.3	20.8	20.3	1.4	2.5	1.4	1.4	6.7
x=6	26.1	37.1	23.6	13.2	1.7	2.4	1.5	0.9	6.5