Electronic Supplementary Material

A novel 3D oxide nanosheets array catalyst derived from hierarchical structured array-like CoMgAl-LDH/graphene nanohybrid for highly efficient NO_x capture and catalytic soot combustion

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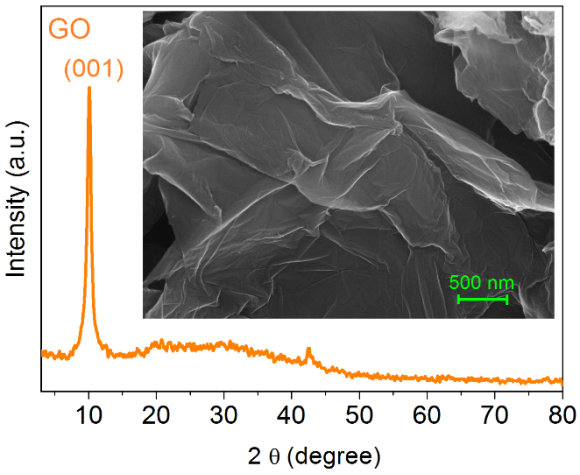

Fig. S1 XRD and SEM image of graphite oxide (GO).

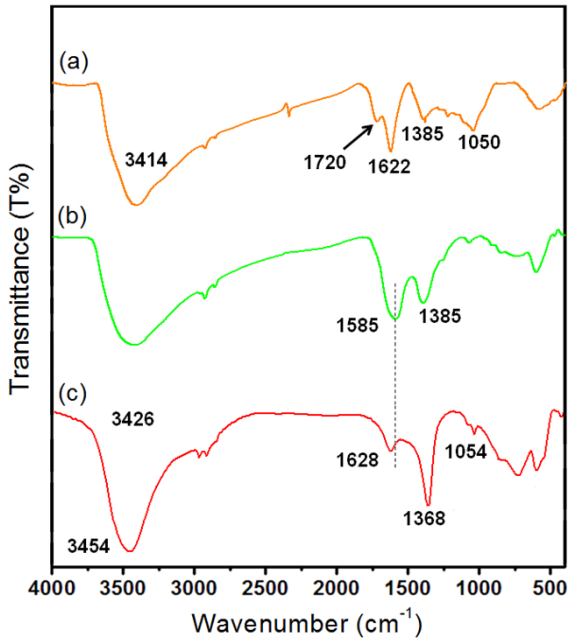

Fig. S2 FTIR spectra of GO (a), CoMgAl-LDH/graphene (b) and CoMgAl-LDH (c).

Table S1 Crystal structure parameters of the LDH precursors upon XRD patterns.

Samples	d_{003}/nm	d_{110}/nm	c/nm [a]	a/nm [a]	D_{003}/nm [b]	D_{110}/nm [b]
CoMgAl-LDH/graphene	0.7303	0.1515	2.19	0.303	4.50	13.6
CoMgAl-LDH	0.7669	0.1534	2.30	0.307	14.2	18.0

[a] Based on hexagonal crystal system, $a = 2d_{110}$, $c = 3d_{003}$.

[b] Based on Scherrer equation. $D_{(hkl)} = k\lambda/\beta\cos\theta$ ($k = 0.89$, λ is the X-ray wavelength (0.1542 nm), θ is the diffraction angle and β is the full width at half-maximum (in radian).

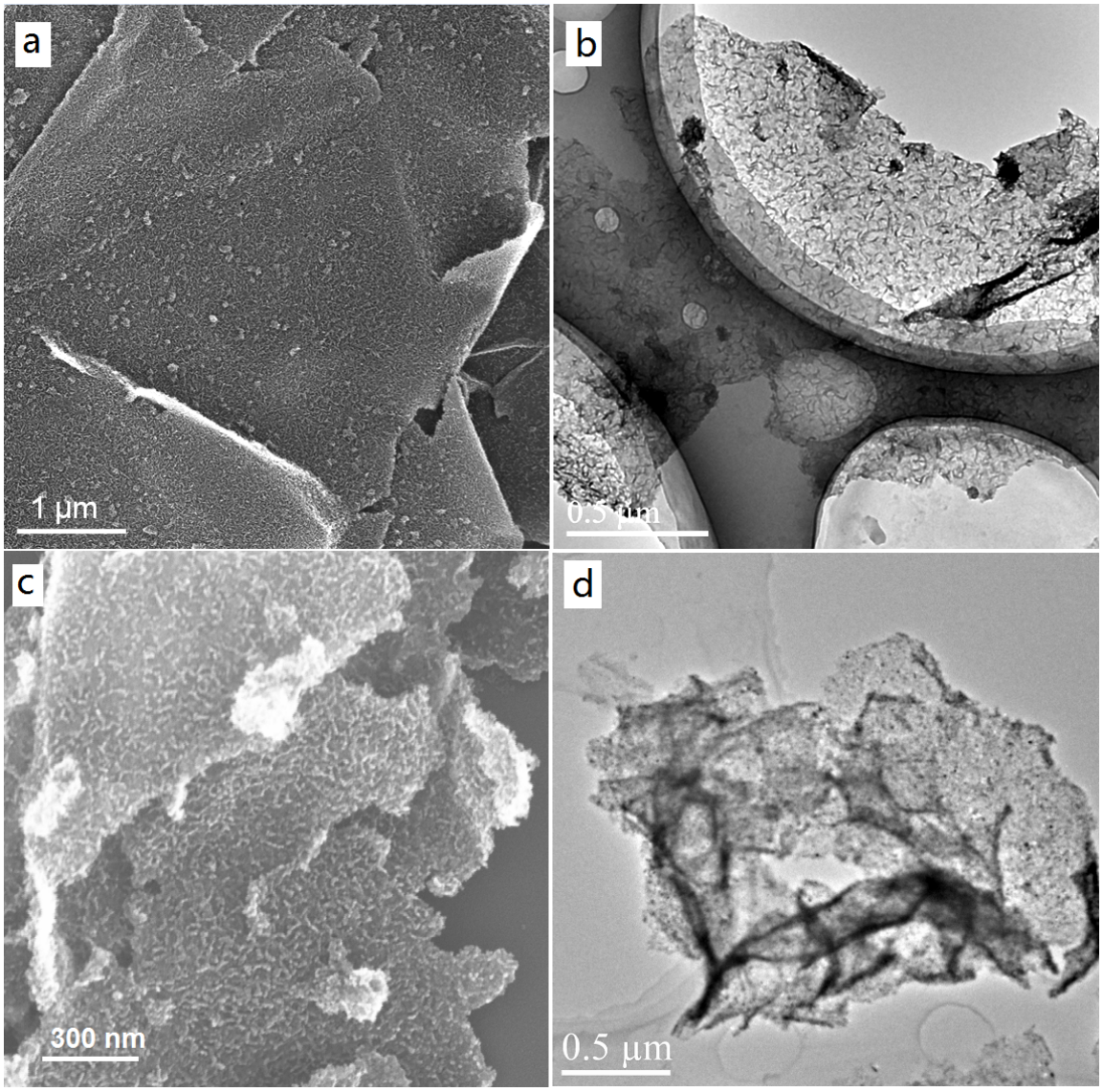

Fig. S3 Low magnification SEM (a, c) and TEM (b, d) images of CoMgAl-LDH/graphene (a, b) and CoMgAlO-array (c, d).

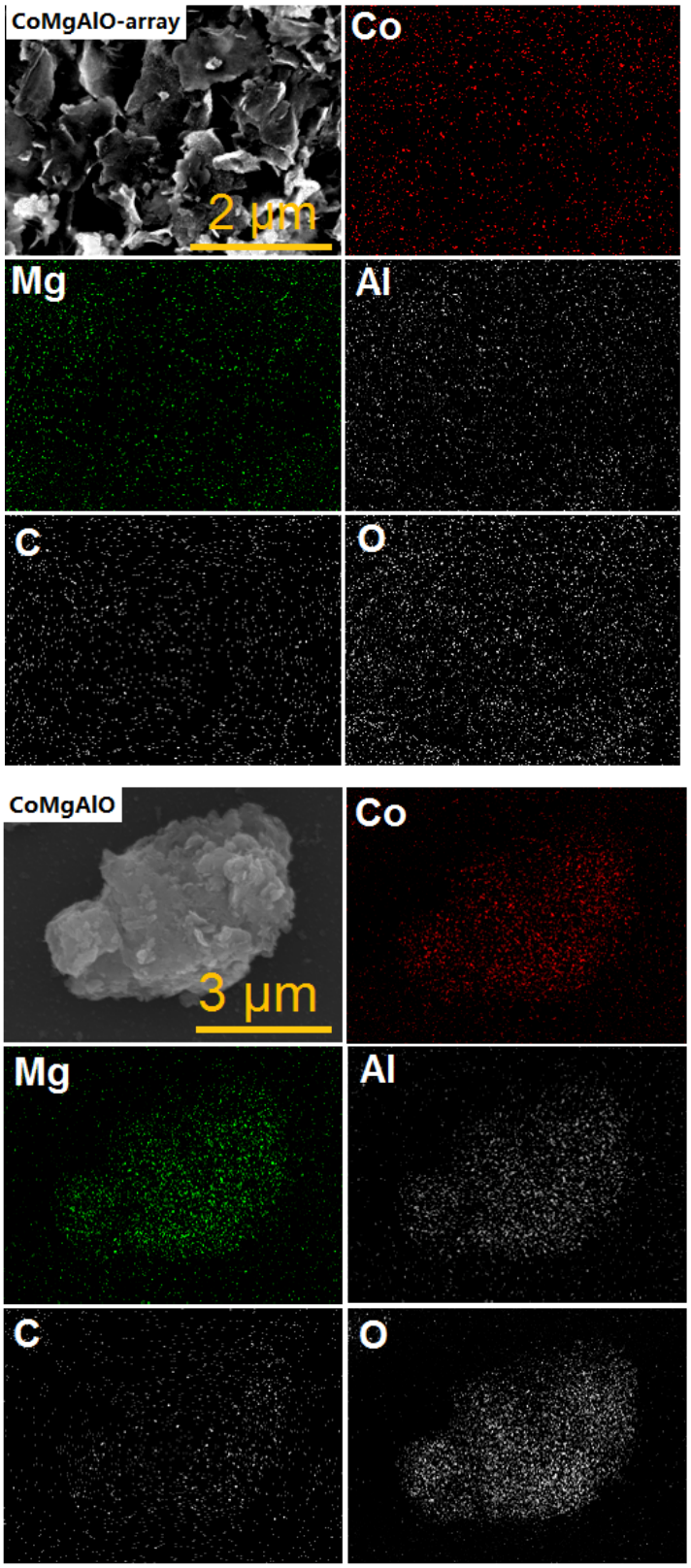

Fig. S4 EDX mapping analyses of catalysts CoMgAlO-array and CoMgAlO.

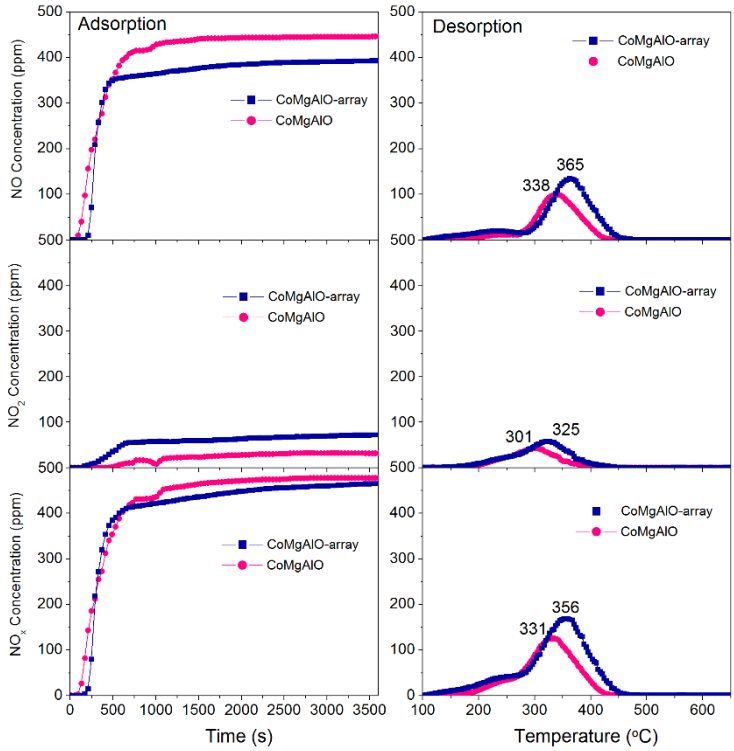

Fig. S5 Variations of NO_x, NO and NO_2 concentrations as a function of time at 200 °C during the storage (left) and desorption (right) on CoMgAlO-array and CoMgAlO.

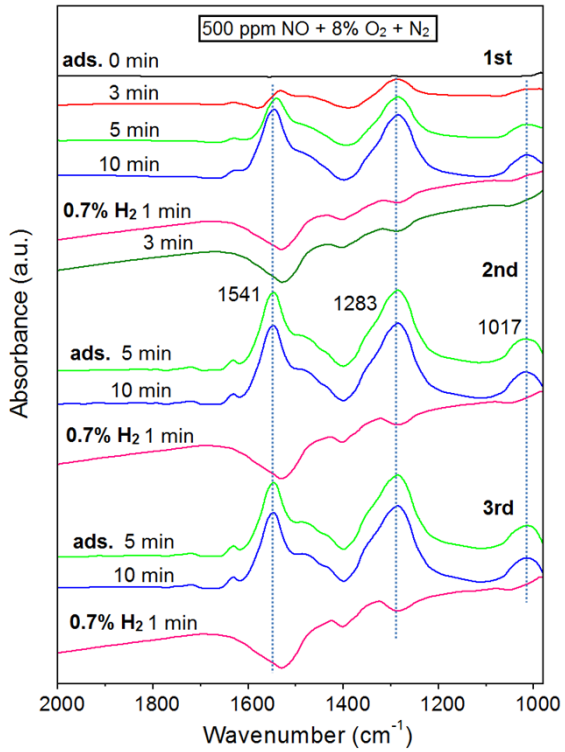

Fig. S6 In situ FT-IR spectra of NO_x storage/reduction cycle tests on CoMgAlO-array at 300 °C. Adsorption (ads.): 500 ppm NO, 8% O_2, and balance N_2; Reduction: H_2/N_2 (0.7 Vol.% H_2), total flow rate 30 mL/min.

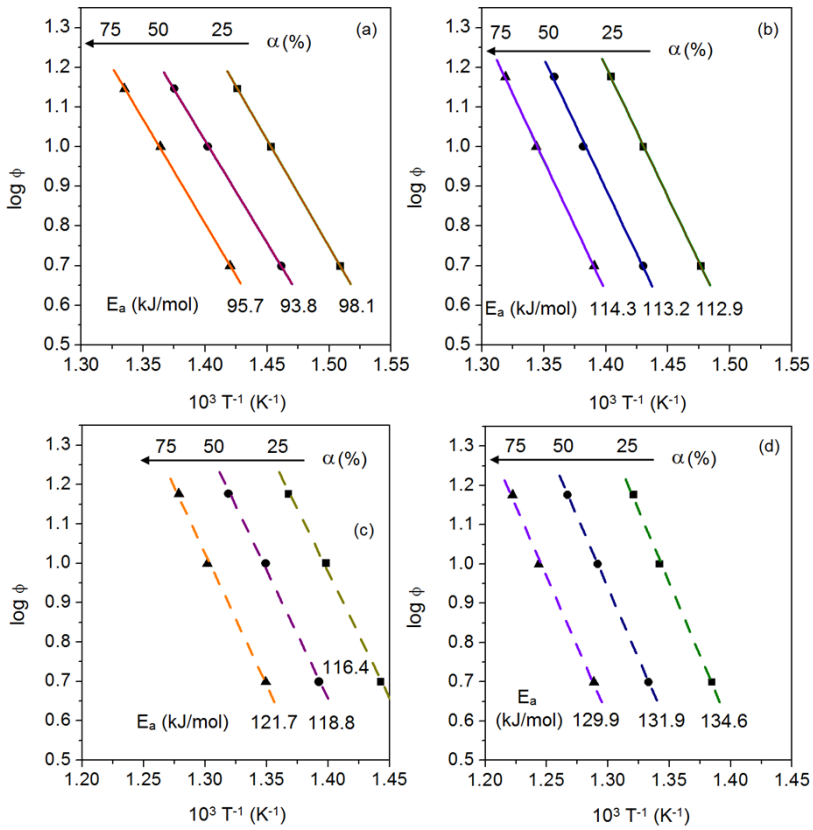

Fig. S7 Ozawa plots for the determination of the activation energy (E_a) of soot combustion over the catalysts CoMgAlO-array (a, c) and CoMgAlO (b, d) under tight contact (a, b) and loose contact (c, d) conditions.