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Supplementary Information

Construction of intimate Lewis acid and basic sites on Al_2O_3-NC composite catalyst with enhanced performance in transfer hydrogenation of cinnamaldehyde

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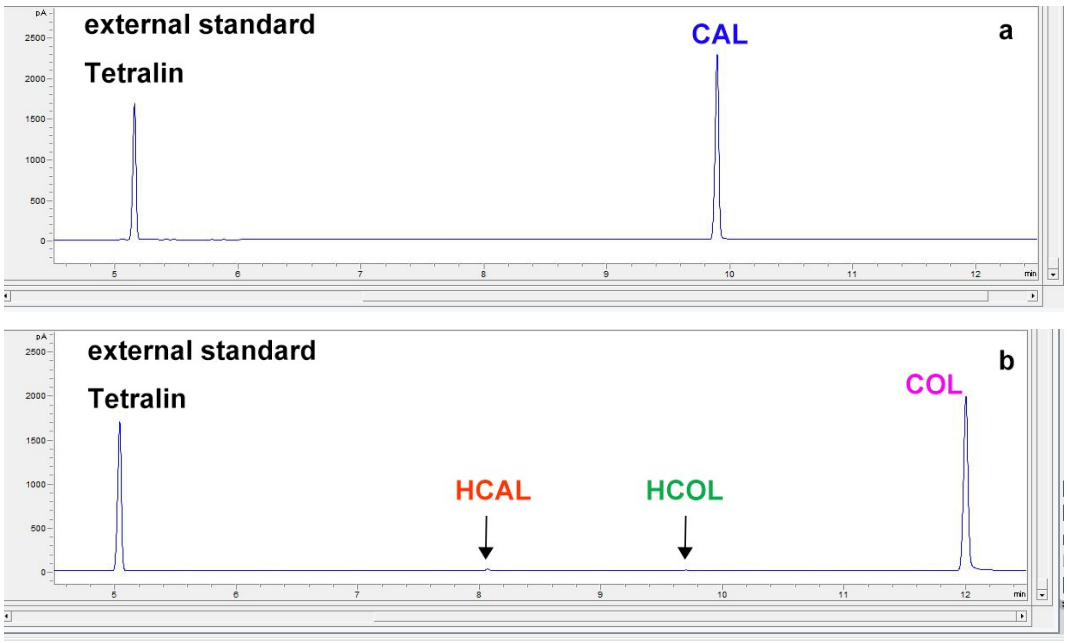


Fig. S1 GC chromatograms of (a) feed and (b) product of CAL selective hydrogenation. Reaction conditions: 0.1 g 10-Al_2O_3-NC, 2 mmol CAL, 30 mL isopropanol, 160 °C, 0.5 MPa N_2, and 3 h.

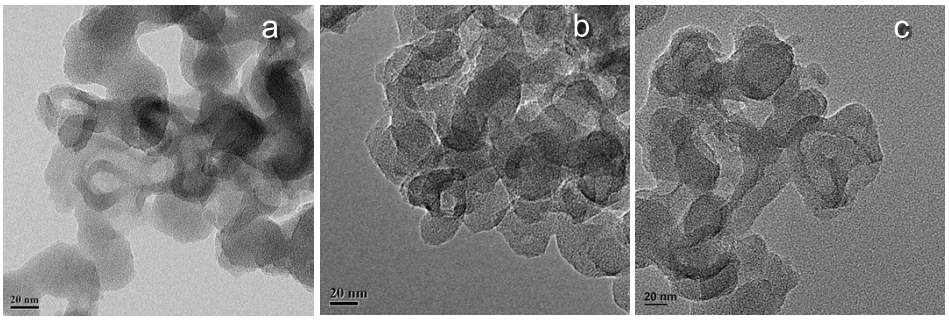
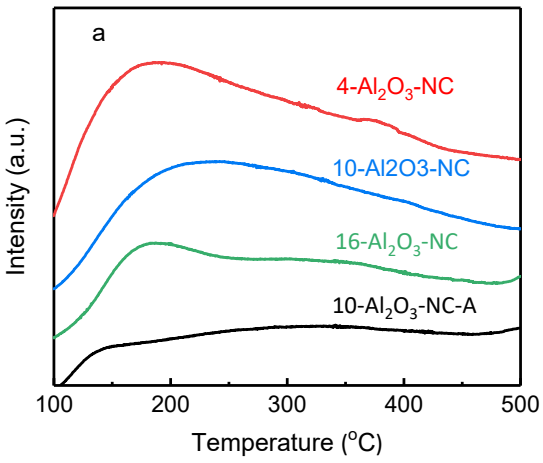


Fig. S2 TEM images of x-Al_2O_3-NC catalysts: (a) 4-Al_2O_3-NC, (b) 10-Al_2O_3-NC, (c) 16-Al_2O_3-NC.



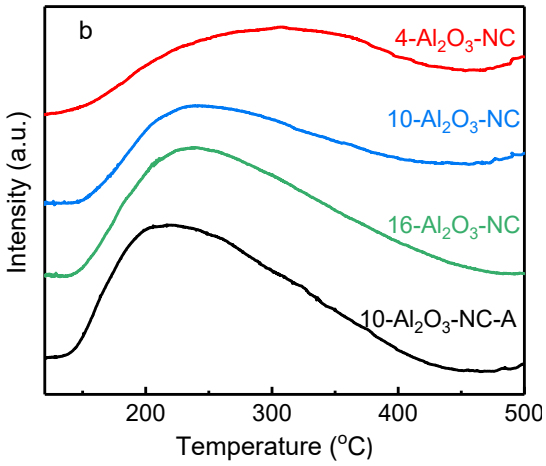


Fig. S3 (a) CO_2-TPD profiles and (b) NH_3-TPD profiles of x-Al_2O_3-NC catalysts and 10-Al_2O_3-NC-A

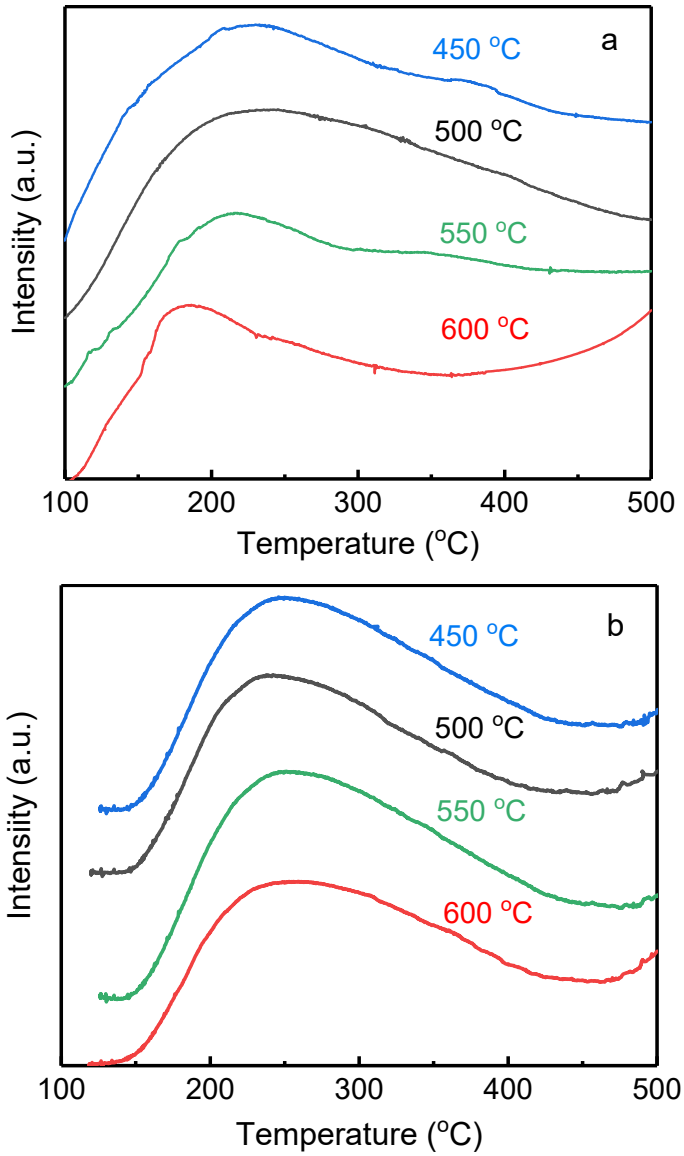


Fig. S4 (a) CO_2-TPD profiles and (b) NH_3-TPD profiles of catalysts treated at different temperatures.

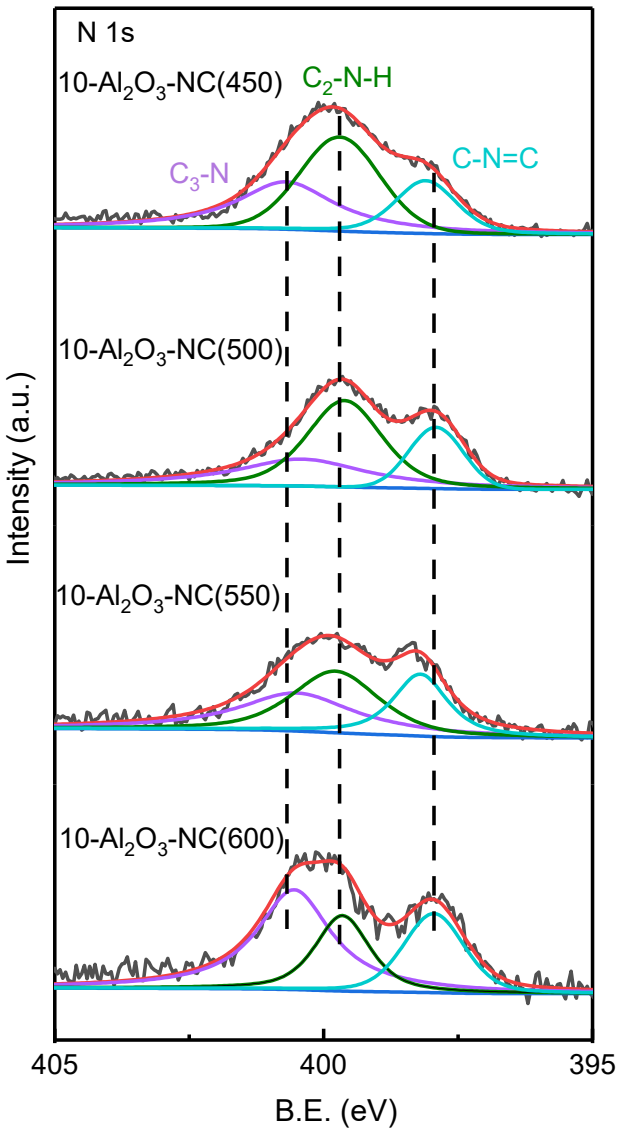


Fig. S5 XPS spectra of 10-Al_2O_3-NC catalysts of N 1s treated at different temperatures.

Table S1 Nitrogen concentration and relative contents of nitrogen functional groups of 10-Al_2O_3-NC treated at different temperatures

Catalyst	N (at. %)	N content (%)		
		graphitic-N	pyrrolic-N	pyridinic-N
10-Al_2O_3-NC (450)	3.36	31	49	20
10-Al_2O_3-NC (500)	3.16	33	42	25
10-Al_2O_3-NC (550)	3.04	40	32	28
10-Al_2O_3-NC (600)	2.42	45	25	31

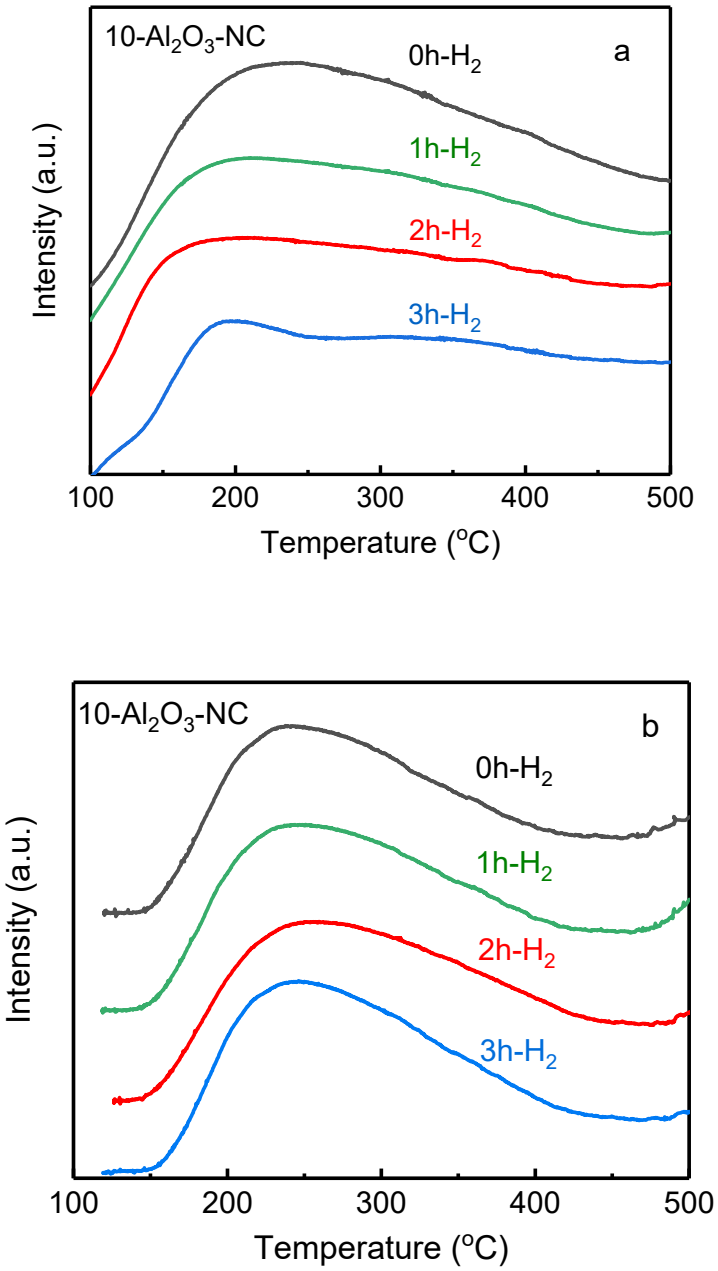


Fig. S6 CO_2-TPD profiles (a) and NH_3-TPD profiles of 10-Al_2O_3-NC before and after hydrogen treatment at 550 °C for different times.

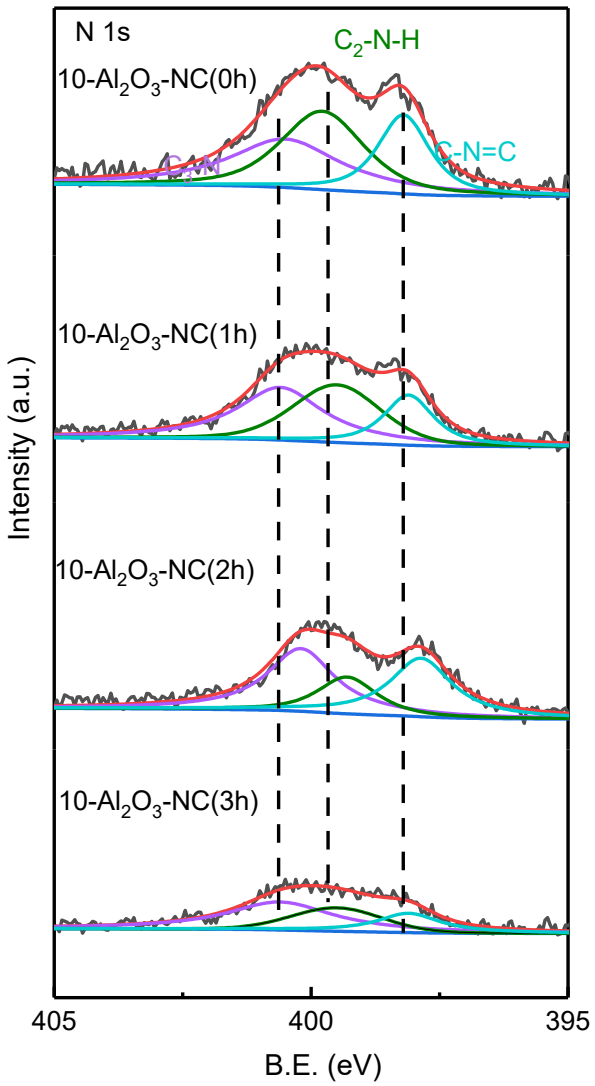


Fig. S7 XPS spectra in the regions of N 1s of 10-Al_2O_3-NC catalysts before and after hydrogen treatment at 550 °C for different times.

Table S2 Nitrogen concentration and relative contents of nitrogen functional groups of 10-Al_2O_3-NC before and after hydrogen treatment at 550 °C for different times

Catalyst	N (at. %)	N content (%)		
		graphitic-N	pyrrolic-N	pyridinic-N
10-Al_2O_3-NC (0h)	3.07	40	32	28
10-Al_2O_3-NC (1h)	2.86	37	37	25
10-Al_2O_3-NC (2h)	2.04	41	35	24
10-Al_2O_3-NC (3h)	1.83	49	33	18

Table S3 Comparison of the catalytic performance of 10-Al_2O_3-NC in different solvents

Entry	Solvents	Conversion/%	COL selectivity/%
1	Methanol	41.7	77.1
2	Ethanol	69.4	94.9
3	Propanol	55.8	97.4
4	Isopropanol	99.0	98.9
5	Butanol	37.3	97.3

Reaction conditions: 2 mmol CAL, 0.1 g 10-Al_2O_3-NC, 30 mL isopropanol, 160 °C, and 3 h.