Electronic Supplementary Information

Synthesis of high surface area mixed metal oxide from NiMgAl LDH precursor for Nitro-aldol condensation reaction

Dipshikha Bharali, Rasna Devi, Pankaj Bharali and Ramesh C. Deka *

Department of Chemical Sciences, Tezpur University, Napaam-784028, India

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XRD Analysis:

The diffraction peaks in case of NiMgAl mixed oxide (Fig 1 (ii)) were observed at 2θ = 16.4 which can be attributed to (001) reflection of θ-Al_2O_3 (JCPDS card No. 86-1410), 21.85, 55.05 and 64.95 are attributed to (200), (422) and(440) reflections, respectively of $MgAl_2O_4$ (JCPDS card No. 77-1193 and 82-2424), 26.9 is attributed to (111) reflection of AlO (JCPDS card No. 75-0278), 30.9 is attributed to (220) reflection of $(Ni_{0.198}Al_{0.802})(Al_{1.198}Ni_{0.802})O_4$ (JCPDS card No. 81-0718), 36.85 and 62.1 are attributed to (111) and (220) reflections of MgO (JCPDS card No. 89-7746 and 79-0612), 44.1 is attributed to (012) reflection of NiO (JCPDS card No. 89-7390), 48.85 is attributed to (133) reflection of k-Al_2O_3 (JCPDS card No. 88-0107) and 52.7 is attributed to (511) reflection of $Mg_{0.36}Al_{2.44}O_4$ (JCPDS card No. 77-0729). The diffraction peaks in case of CoMgAl mixed oxide (Fig 1 (ii)) were observed at 2θ = 12 is attributed to (110) reflection of $Al_{12}Mg_{17}$ (JCPDS card No. 73-1148), 22.2 and 43.45 are due to $Co_6Al_2O_{11}$ (JCPDS card No. 51-0041), 25.1 is attributed to (012) reflection of A_2O_3 (JCPDS card No. 89-3072), 35.55 is attributed to (222) reflection of $Mg_{0.36}A_{l2.44}O_4$ (JCPDS card No.77-0729) and 62.6 is attributed to (112) reflection of CoO (JCPDS card No.65-5474).

Table S1

Textural properties of mixed oxides.

Entry	Catalysts	S_{BET} (m^2/g)	Pore Volume (cm^3/g)	Pore Diameter (Å)
1	MgAl (O)	561	0.974	88
2	NiMgAl (O)	753	1.279	49.6
3	CoMgAl (O)	401	0.937	107

Table S2

Effect of calcination temperature on Nitro-aldol condensation reaction of 4-nitrobenzaldehyde and nitromethane catalyzed by NiMgAl mixed oxide [a]

Entry	Calcination Temperature (°C)	Time (h)	Conversion (%)[b]
1	350	6	84
2	450	2	99
3	550	8	86

[a]Reactions were carried out with 1:10 molar ratio in a 1 mmol scale of 4-nitrobenzaldehyde and nitromethane using 10 mg catalyst

[b]Determined from ^{1}H NMR data of crude mixture

Table S3
Recyclability of the catalyst

Entry	No. of cycle	Time(h)	Conversion(%)[a]
1	1st run	2	96
2	2nd run	3	95
3	3rd run	4	92

[a] Determined from ^{1}H NMR data of crude mixture

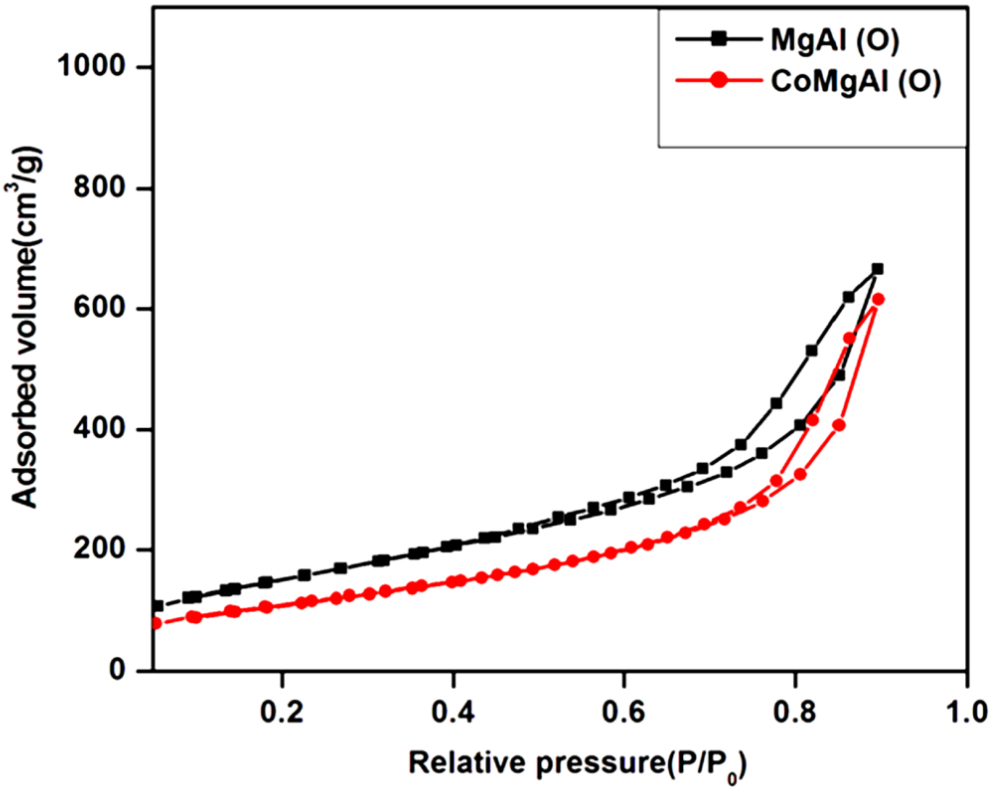


Fig. S1 Nitrogen-sorption isotherms of MgAl and CoMgAl mixed oxides.

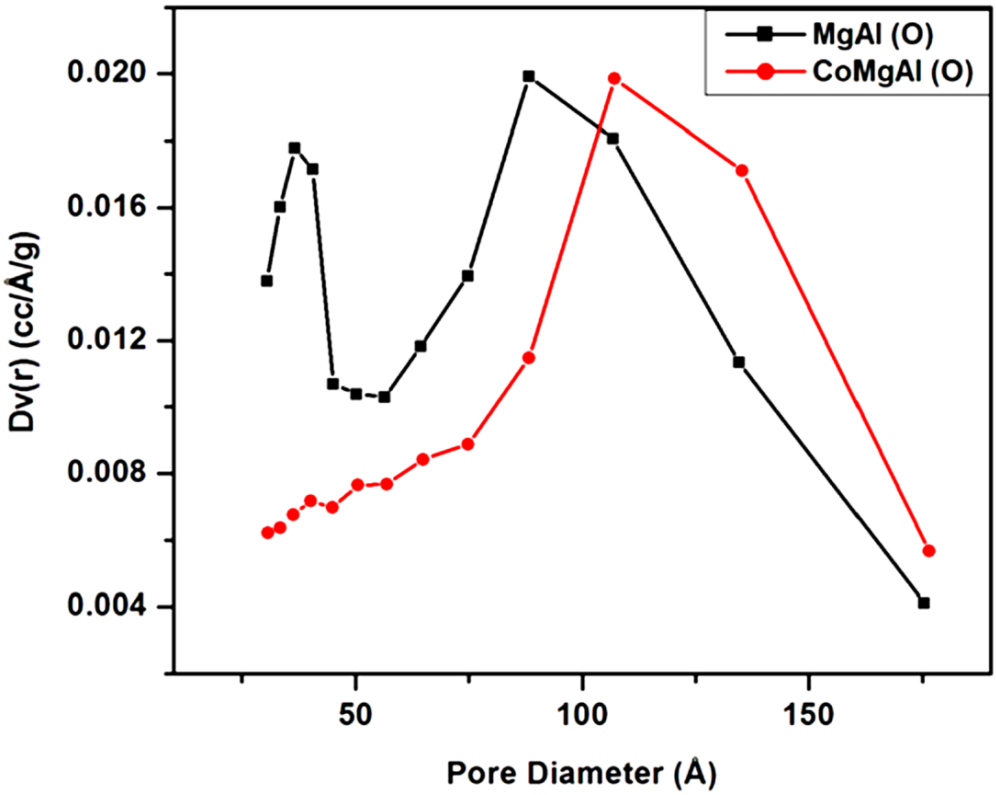


Fig. S2 Pore size distribution curve of MgAl LDH and CoMgAl mixed oxides.

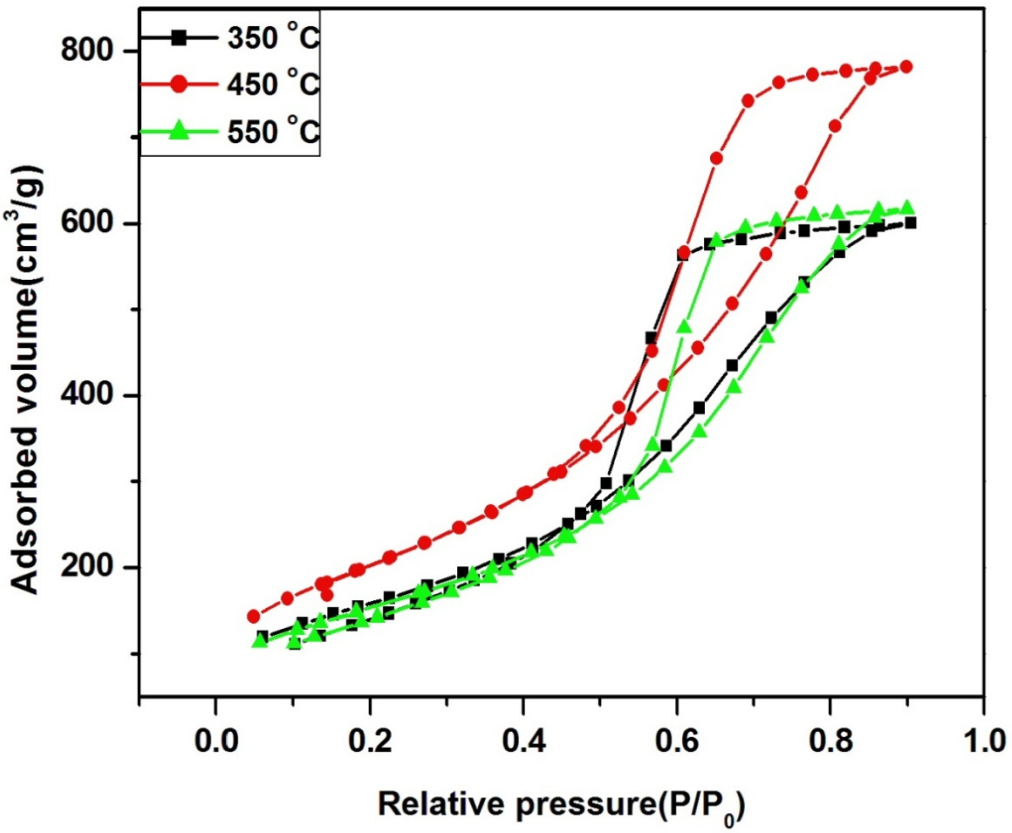


Fig. S3 N_2 adsorption-desorotion graphs of NiMgAl (O) at different calcination temperature.

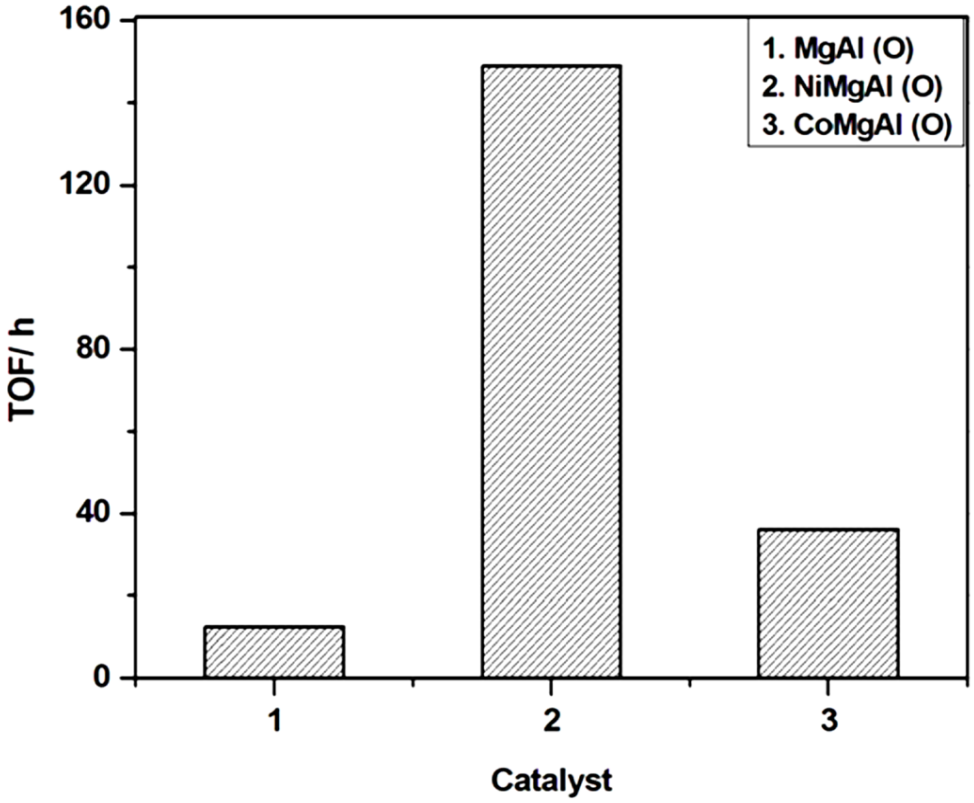
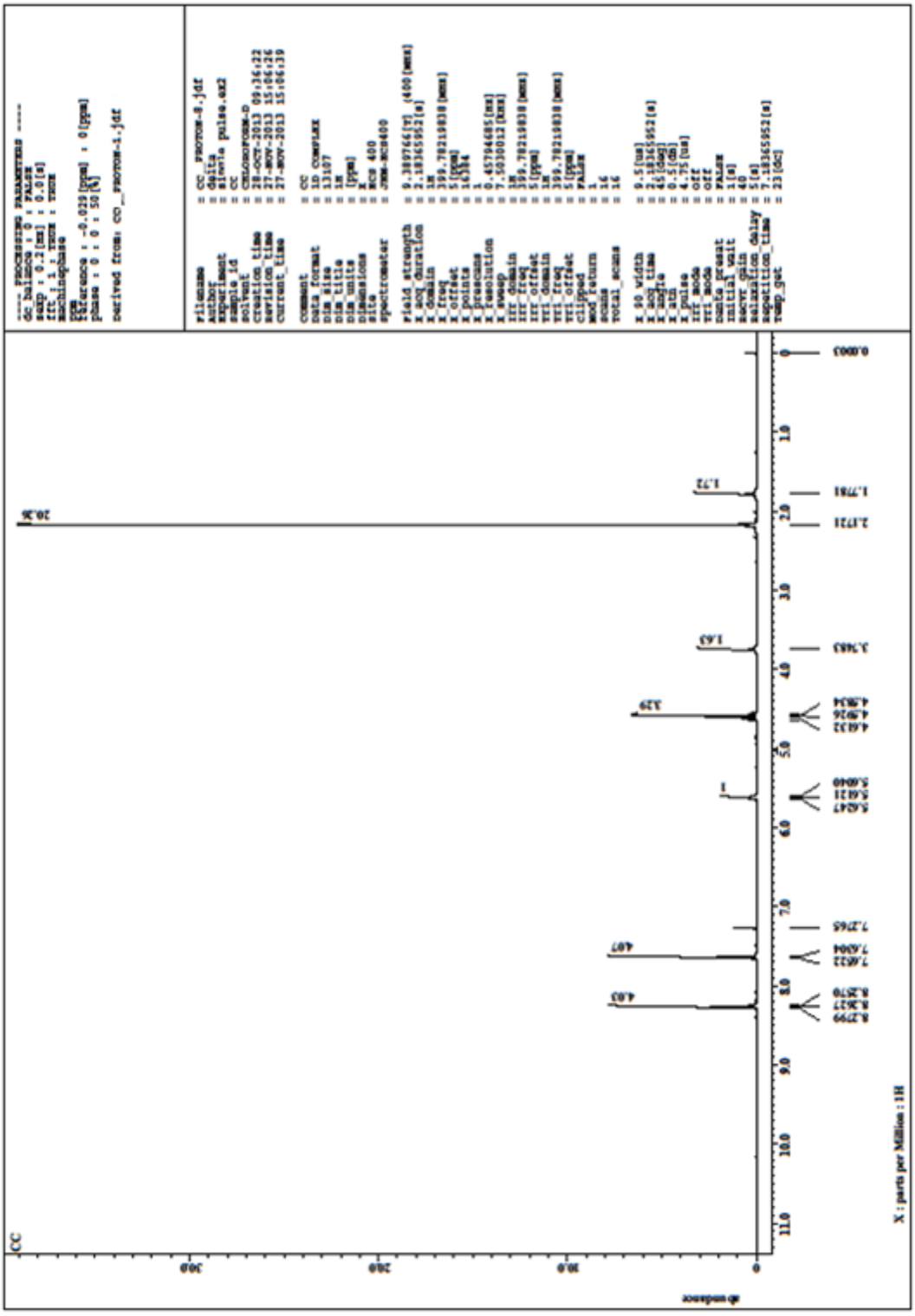


Fig. S4 Turnover frequency (TOF) of mixed metal oxides.

^{1}H NMR Spectra:



^{13}C NMR Spectra: