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Supporting Information

Comparison of transition metal (Fe, Co, Ni, Cu, and Zn) containing tri-metal layered double hydroxides (LDHs) prepared by urea hydrolysis

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Table 2 (b): Peak positions for the (003), (006) and (009) planes, interlayer distance (d_{003}) and crystal lattice parameters (c and a) of the MgMAl-LDHs with M = (Fe, Co, Ni, Cu, Zn) 10 % molar substitutions synthesized using urea hydrolysis.

Sample ID	2θ (003) (°)	2θ (006) (°)	2θ (009) (°)	2θ (110) (°)	$d_{(003)}$ (Å)	*c* (Å)	*a* (Å)
MgAl	13.612	27.495	40.893	72.242	7.548	22.644	3.035
MgFeAl-10	13.524	27.362	40.826	72.155	7.597	22.791	3.038
MgCoAl-10	13.612	27.495	40.848	72.111	7.548	22.644	3.040
MgNiAl-10	13.502	27.318	40.717	72.067	7.609	22.828	3.041
MgCuAl-10	13.611	27.318	40.672	71.912	7.549	22.646	3.047
MgZnAl-10	13.612	27.472	40.783	72.023	7.548	22.644	3.043

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Table 3: TGA data of MgMAl LDHs with M = (Fe, Co, Ni, Cu, Zn) synthesized using urea hydrolysis showing $^{T_{max}}$ of the derivative weight ($^{T_{max}\,DW}$), $^{T_{final}}$ of the decomposition step ($^{T_{final}\,DS}$), the weight loss at $^{T_{final}}$ (WL $^{T_{final}}$), the total weight loss (TW), and observations for the tested LDHs. Standard deviations obtained through triplicate TGA are shown for T_{max} DW and TW.

LDHs (Loading in mg)	T_{max} DW (°C)	T_{final} DS (°C)	WL T_{final} (%)	TW (%)	Observations
MgAl	183	230	16.5	43.1	1-Removal of structural H_2O
(6.061)	290	350	9.5		2-Decomposition of CO_3^{-2}
	415	590	12.5		3-Dehydroxylation
	683	800	3.7		4-Amorphous phase formation above 500°C
	930	1000	0.9		
MgFeAl-5 (5.607)	184	230	17.3	40.65	1-Removal of structural H_2O
	288	350	9.7		2-Decomposition of CO_3^{-2}
	404	600	9.5		3-Dehydroxylation
	685	850	3.4		4-Formation of metal oxides of MgFeAl-LDHs
	942	1000	0.75		
MgFeAl-10	186	225	15.7	39.7	1-Removal of structural H_2O
(5.758)	290	350	9.9		2-Decomposition of CO_3^{-2}
	405	590	9.8		3-Dehydroxylation
	685	850	3.6		4- formation of metal oxides of MgFeAl-LDHs
	940	1000	0.7		
MgCoAl-5	169	240	20.1	44	1-Removal of structural H_2O
(6.005)	291	340	10.2		2-Decomposition of CO_3^{-2}
	372/s410	600	10.7		3-Dehydroxylation
	689	1000	3.0		4- Formation of metal oxides of MgCoAl-LDHs (amorphous phase formation above 500°C)
MgCoAl-10	183	235	18.7	39.9	1-Removal of structural H_2O
(6.595)	277	375	10.8		2-Decomposition of CO_3^{-2}
	410	585	6.8		3-Dehydroxylation
	680	1000	3.6		4- Formation of metal oxides of MgCoAl-LDHs (amorphous phase formation above 500°C)
MgNiAl-5	190	240	17.3	41.9	1-Removal of structural H_2O
(5.349)	304	350	10.8		2-Decomposition of CO_3^{-2}
	390	635	12.4		3-Dehydroxylation
	668	845	1.1		4- Formation of metal oxides of MgNiAl-LDHs
	915	1000	0.3		
MgNiAl-10	195	230	11.8	42.4	1-Removal of structural H_2O
(6.107)	315	360	3.8		2-Decomposition of CO_3^{-2}
	392	620	12.75		3-Dehydroxylation
	658	865	12.3		4- Formation of metal oxides of MgNiAl-LDHs
	940	1000	1.45		
MgCuAl-5	177	225	18.1	41.7	1-Removal of structural H_2O
(5.743)	268	333	7.5		2-Decomposition of CO_3^{-2}
	413	600	11.4		3-Dehydroxylation
	685	800	3.2		4- Formation of metal oxides of MgCuAl-LDHs
	840	910	1.0		
	955	1000	0.5		
MgCuAl-10	168	220	17.5	41.7	1-Removal of structural H_2O
(4.061)	262	325	7.1		2-Decomposition of CO_3^{-2}
	410	600	12.0		3-Dehydroxylation
	683	800	3.3		4- Formation of metal oxides of MgCuAl-LDHs
	shoulder	1000	1.8		

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LDHs (Loading in mg)	T_{max} DW (°C)	T_{final} DS (°C)	WL T_{final} (%)	TW (%)	Observations
MgZnAl-5 (5.686)	181	220	15.9		1-Removal of structural H_2O
	267	335	7.9	41.5	2-Decomposition of CO_3^{-2}
	420	600	14.3		3-Dehydroxylation
	680	850	2.8		4- Formation of metal oxides of MgZnAl-LDHs
	913	1000	0.6		
MgZnAl-10 (5.710)	178	225	18.0	39.5	1-Removal of structural H_2O
	254	325	6.3		2-Decomposition of CO_3^{-2}
	415	610	11.8		3-Dehydroxylation
	687	800	2.2		4- Formation of metal oxides of MgZnAl-LDHs
	847	1000	1.2		

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