

Electronic Supplementary Information (ESI)

Table S1. Summary of Ni/Mg/Al hydrotalcite-based catalytic systems tested in dry reforming of methane.

Type of catalysts	Method of hydrotalcite synthesis	Cations in brucite-like layers	Ni/Mg or Ni loading (%)	M ^{II} /M ^I "	Calcination conditions	Ref .
Mixed oxides derived from Ni/Al and Ni/Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	1, 0.2	2, 3	No data	27
Mixed oxides derived from Ni/Mg/Al hydrotalcites; Ni supported on Mg/Al hydrotalcites	Solid phase crystallization	Ni ²⁺ , Mg ²⁺ , Al ³⁺	1/2	3	650, 850°C, 14 h	28
	Impregnation of Ni ²⁺ on Mg/Al hydrotalcite	Mg ²⁺ , Al ³⁺	25.1 wt.%Ni	3		
Mixed oxides derived from Ni/Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	1/5, 1/3, 1	6, 4, 2, 2/3, 2/5	500°C, 10 h	29
Mixed oxides derived from Ni/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Al ³⁺	-	2, 3, 5, 8, 10	300, 400, 500, 600, 700, 800°C, 6 h	30
Mixed oxides derived from Ni/Al hydrotalcite precursors	Co-precipitation at constant pH	Ni ²⁺ , Al ³⁺	-	4	550°C, 4 h	31
Mixed oxides derived from Ni/Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	0.5, 1, 2, 5	0.4, 0.9, 2	400, 600, 800°C, 6 h	32
Ni supported on MgAl ₂ O ₄ spinels derived from hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	1, 3, 5, 10, 15 wt.% Ni	nd	900°C, 5 h	33
Mixed oxides derived from Ni/Mg/Al hydrotalcites	Sol-gel method	Ni ²⁺ , Mg ²⁺ , Al ³⁺	4, 15 19 wt.%Ni	nd	500, 650°C, 5 h	34
Mixed oxides phase derived from Ni/Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	3, 6, 9, 12, 15, 18 wt.%	3	800°C, 5 h	39
Nickel introduced into Mg/Al hydrotalcites	Co-precipitation with [Ni(EDTA)] ²⁻ chelate	Mg ²⁺ , Al ³⁺	-	3	500°C, 16 h	35
Nickel introduced into Mg/Al hydrotalcites	Co-precipitation with [Ni(EDTA)] ²⁻ chelate	Mg ²⁺ , Al ³⁺	1/7	3.5	500°C, 16 h	36
	Anion-exchange reaction of NO ₃ ⁻ of MgAl-NO ₃ with [Ni(EDTA)] ²⁻ chelate	Mg ²⁺ , Al ³⁺	1/11	3.3		
	Reconstruction of LDH structure for Mg/Al mixed oxide in an aqueous solution of [Ni(EDTA)] ²⁻	Mg ²⁺ , Al ³⁺	1/11	3.6		
	Co-precipitation at constant pH	Mg ²⁺ , Al ³⁺	1/5	2.5		
	Impregnation of Ni ²⁺ on Mg/Al hydrotalcite	Mg ²⁺ , Al ³⁺	25.1 wt.%Ni	3		
Mixed oxides derived from Ni/Al and Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Al ³⁺	63.5 wt.%	4	550°C, 4 h	37
	Nickel introduced via adsorption from aqueous solution of [Ni(EDTA)] ²⁻ chelate	Mg ²⁺ , Al ³⁺	0.8 wt.%	3		
Mixed oxides phase derived from Ni/Mg/Al hydrotalcites	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	2.94	2	350, 600, 800, 1000°C	38
Mixed oxides phase derived from Ni/Mg/Al hydrotalcites	Surfactant-assisted co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	10 wt.%	3	700°C, 6 h	40
Mixed oxides phase derived from Ni/Al and Ni/Mg/Al hydrotalcite precursors	Co-precipitation at constant pH	Ni ²⁺ , Mg ²⁺ , Al ³⁺	4, 12, 20, 36, 49, 59 wt.%	3	550°C for 4 h in air	This work

Table S2. Summary of Ni/Mg/Al hydrotalcite-based catalytic systems tested in dry reforming of methane.

Catalyst	Ni (wt.%)	Mg (wt.%)	Al (wt.%)	Ni/Mg*	M ^{II+} /M ^{III+} **	S _{BET} (m ² /g)	V _{tot} (cm ³ /g)
HT-100Ni	58.66	-	8.92	-	3.02 (3.0)	121	0.24
HT-75Ni	49.10	6.57	10.9	3.09 (3.0)	2.74 (3.0)	127	0.29
HT-50Ni	36.59	14.79	11.07	1.02 (1.0)	3.00 (3.0)	126	0.35
HT-25Ni	19.57	23.85	11.76	0.34 (0.33)	3.02 (3.0)	115	0.41
HT-15Ni	12.27	30.96	13.23	0.16 (0.18)	3.02 (3.0)	-	-
HT-5Ni	2.79	37.98	15.24	0.03 (0.06)	2.94 (3.0)	-	-
HT-MgAl	-	37.42	4.15	-	2.98 (3.0)	95	0.84