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Supplementary Information

Vapor adsorption experiments as a characterization tool for layered catalysts

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1. Scanning electron micrography of Na-[Al]-magadiite and Na-[Al]-RUB-18.

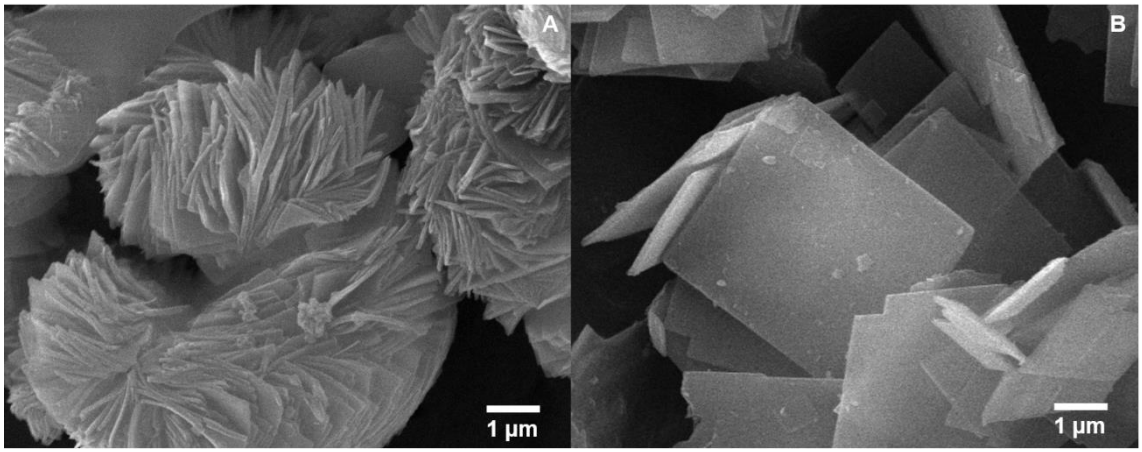

Fig. S1. Scanning electron micrography of Na-[Al]-magadiite (A) and Na-[Al]-RUB-18 (B) samples.

2. X ray diffraction of sodium and protonic magadiite and RUB-18.

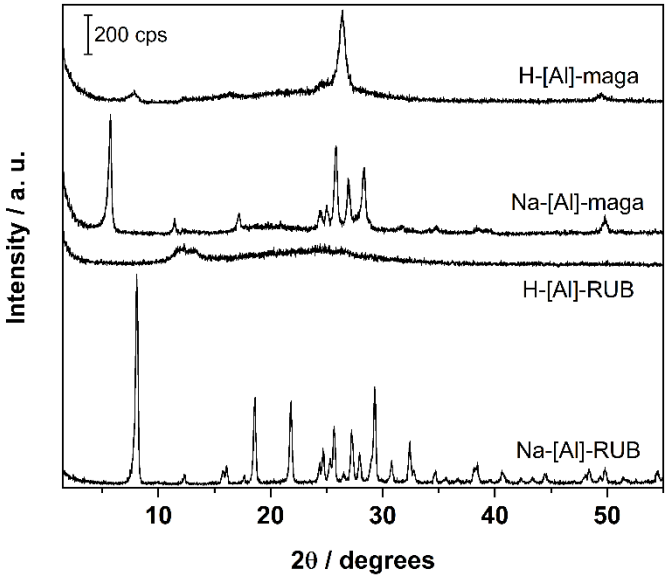

Fig. S2. X ray diffraction of the synthetized materials (Na-[Al]-maga and Na-[Al]-RUB) and after ammonia thermodecomposition (H-[Al]-maga and H-[Al]-RUB).

3. Fourier Transform Infrared (FTIR) of protonic magadiite and RUB-18.

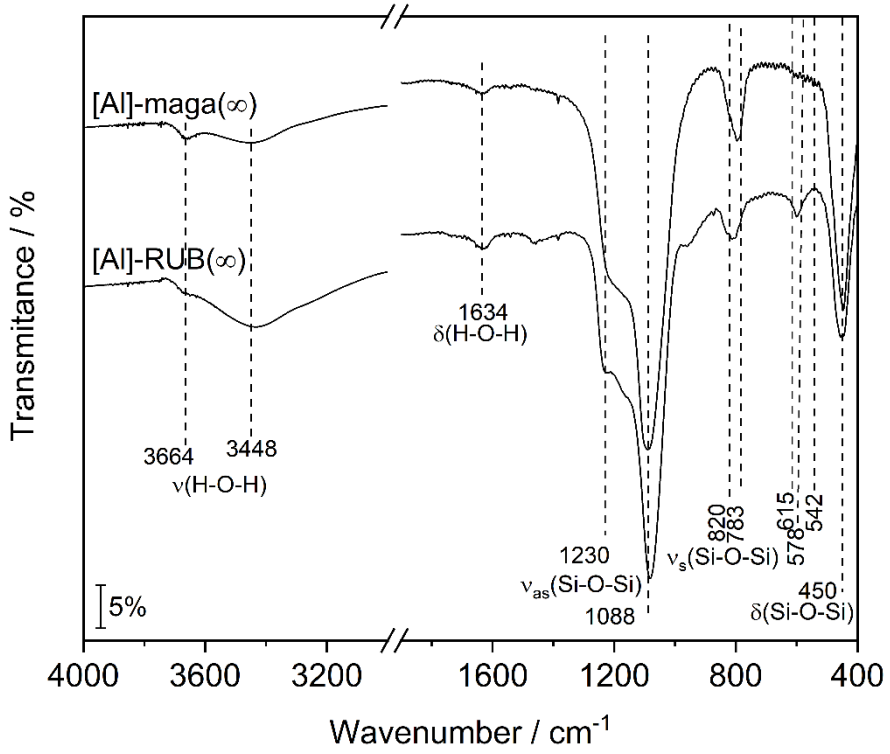

Fig. S3. Examples of FTIR spectrum of protonic materials after the thermodecomposition of ammonia.

Table S1. Assignment of FTIR bands of the layered materials[1]

Wavenumber [cm^{-1}]	Assignment	Observation
3664; 3448	ν(H-O-H)	water molecules and/or silanois groups
1634	δ(H-O-H)	water molecules vibration
1230; 1088	ν_{as}(Si-O-Si)	internal vibration of 5 member rings present in the solids structure
820; 783	ν_s (Si-O-Si)	vibrations of TO4 groups in the structure
615; 578		double ring vibration present in the solids structure
450; 443	δ(Si-O-Si)	deformation of Si-O-Si groups

1: Y. Huang, Z. Jiang, W. Schwieger, *Chemistry of materials*, 1999, **11**, 1210-1217.

4. Surface and porosity characterization of [Al]-magadiites and [Al]-RUB

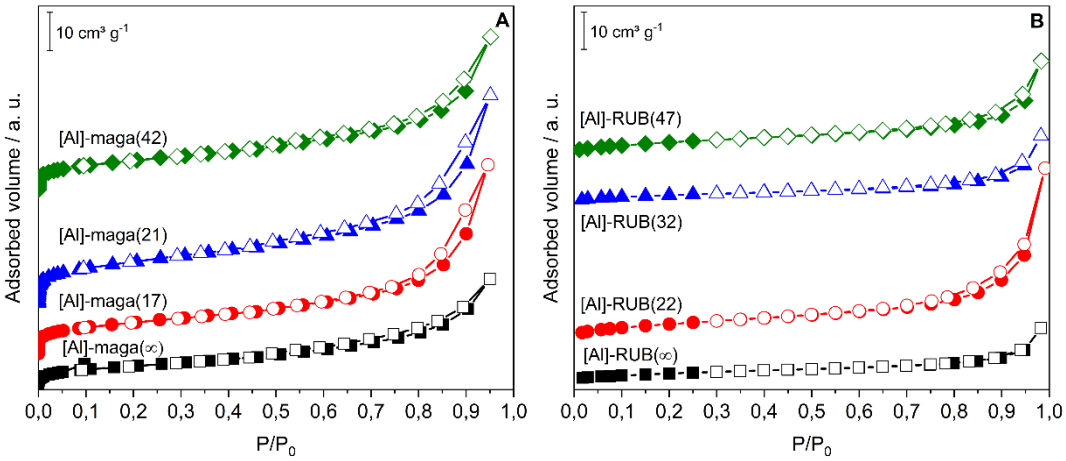

Fig. S4. Physisorption of N_2 in H-[Al]-magadiites (A) and Ar in H-[Al]-RUB-18 samples (B).

Table S2. Surface area and total pore volume data obtained by N_2 and Ar physisorption

Protonic solid	Si/Al	A_{BET} / m² g^{-1}	Total por volume / cm³ g^{-1}
[Al]-maga	∞	21.8	0.04
	17	24.7	0.08
	21	40.9	0.09
	42	29.4	0.06
[Al]-RUB	∞	6.7	0.02
	22	12.5	0.06
	32	7.3	0.02
	47	10.6	0.03

5. Solid state nuclear magnetic resonance of ^{27}Al nuclei

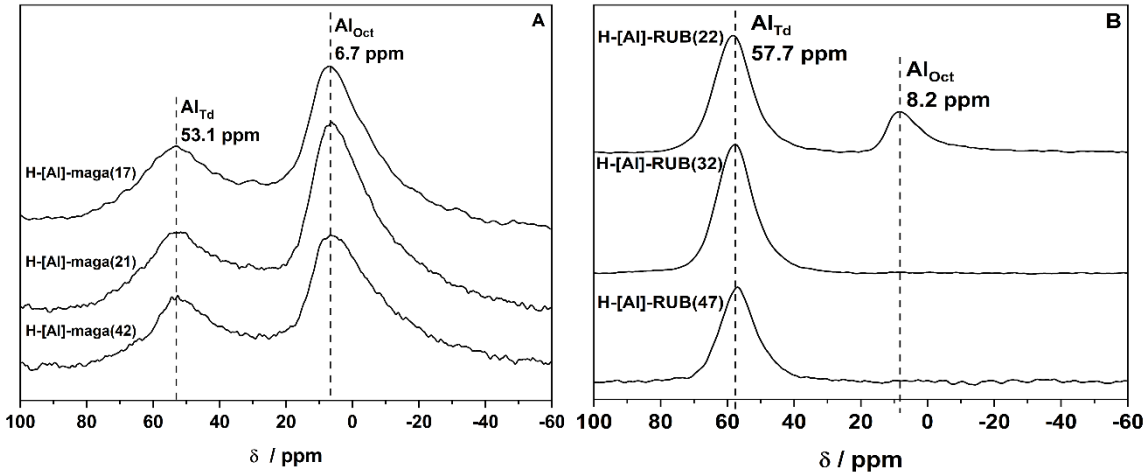

Fig. S5. Solid state NMR of ^{27}Al nuclei of (A) for H-[Al]-magadiite samples and (B) H-[Al]-RUB samples.

Table S3. Ethanol adsorption and materials data.

Sample	V_{ads} [$cm^3\ g^{-1}$]	n_{et} [mol EtOH/g]	Al_{Td}	Al_{Oct}	n_{Al} [moles of Al/g]	V_{ads}/n_{Al} [L of EtOH/moles of Al]	n_{et}/n_{Al} [moles of EtOH/moles of Al]
Na-maga(∞)	2.5	4.3E-2	-	-	-	-	-
Na-[Al]-maga(17)	3.3	5.6E-2	-	-	8.7E-04	3.8	64.7
Na-[Al]-maga(21)	3.3	5.6E-2	-	-	7.1E-04	4.7	79.0
Na-[Al]-maga(42)	2.8	4.8E-2	-	-	3.7E-04	7.7	131.5
H-maga(∞)	6.4	1.1E-1	-	-	-	-	-
H-[Al]-maga(17)	3.9	6.8E-2	28%	72%	8.7E-04	4.5	78.6
H-[Al]-maga(21)	5.7	9.8E-2	31%	69%	7.1E-04	8.0	138.2
H-[Al]-maga(42)	6.1	1.0E-1	36%	64%	3.7E-04	16.7	274.0
H-RUB(∞)	0.7	1.2E-2	-	-	-	-	-
H-[Al]-RUB(22)	4.0	6.9E-2	76%	24%	4.5E-04	9.0	154.7
H-[Al]-RUB(32)	4.7	8.1E-2	100%	-	4.3E-04	10.9	187.5
H-[Al]-RUB(47)	5.0	8.7E-2	100%	-	3.0E-04	16.7	291.0

n_{et}: moles of ethanol adsorbed per gram of material.

n_{Al}: moles of aluminum per gram of material determined by X ray fluorescence.

V_{ads}/n_{Al}: volume adsorbed of ethanol adsorbed per moles of aluminum.

n_{et}/n_{Al}: moles of ethanol per moles of aluminum.

Table S4. Pentane adsorption and materials data.

Sample	V_{ads} [$cm^3\ g^{-1}$]	n_p [mol pentane/g]	Al_{Td}	Al_{Oct}	n_{Al} [moles of pentane/g]	V_{ads}/n_{Al} [L of pentane/moles of Al]	n_p/n_{Al} [moles of /moles of Al]
H-maga(∞)	3.0	2.6E-2	-	-	-	-	-
H-[Al]-maga(42)	3.9	3.4E-2	36%	64%	3.7E-04	10.7	93.2
H-[Al]-RUB(∞)	1.0	8.9E-3	-	-	-	-	-
H-[Al]-RUB(47)	5.1	4.4E-2	100%		3.0E-04	17.1	148.7

n_p: moles of pentane adsorbed per gram of material.

n_{Al}: moles of aluminum per gram of material determined by X ray fluorescence.

V_{ads}/n_{Al}: volume adsorbed of pentane adsorbed per moles of aluminum.

n_p/n_{Al}: moles of pentane per moles of aluminum.