Synthesis of Periodic Mesoporous Organosilicas with Incorporated Aluminium

Benjamin J. Hughes, Jean-Baptiste Guilbaud, Mathieu Allix and Yaroslav Z. Khimyak*

[a] Molecular Materials Centre, Department of Chemistry, University of Liverpool, Liverpool, L69 7ZD, United Kingdom. Fax: 0151 794 3587; Tel: 0151 794 3535; E-mail: khimyak@liv.ac.uk

Electronic Supplementary Information

Figure S1. Powder X-ray diffraction patterns of as-synthesised Al-CH_2-CH_2-PMO with different Si/Al ratios.

Figure S2. ^{27}Al MAS NMR spectra of Al-CH_2-CH_2-PMOs (as-synthesised) with different Si/Al ratios.

Figure S3. ^{1}H-^{29}Si MAS NMR spectra of as-synthesised Al-CH_2-CH_2-PMOs with different Si/Al ratios.

Identification of acidic sites by FTIR spectroscopy of adsorbed pyridine.

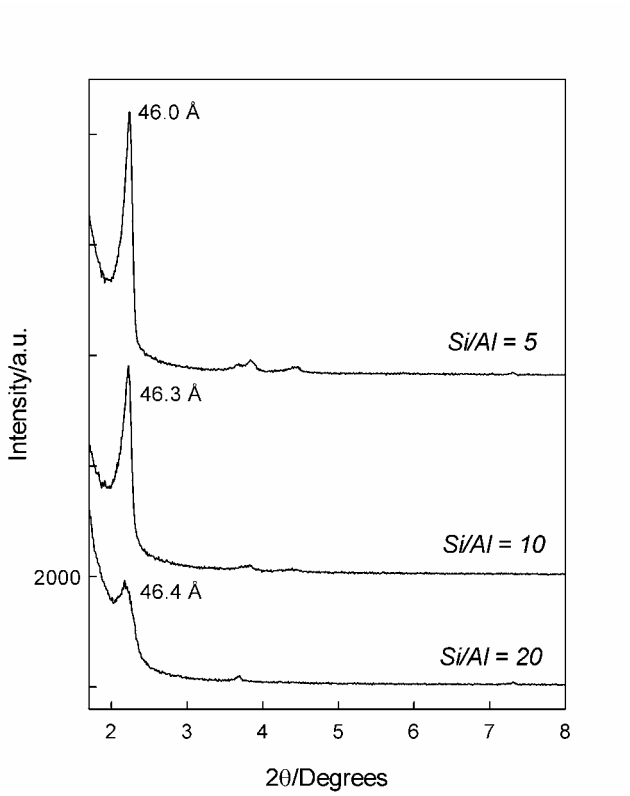

Figure S1. Powder X-ray diffraction patterns of as-synthesised Al-CH_2-CH_2-PMO with different Si/Al ratios.

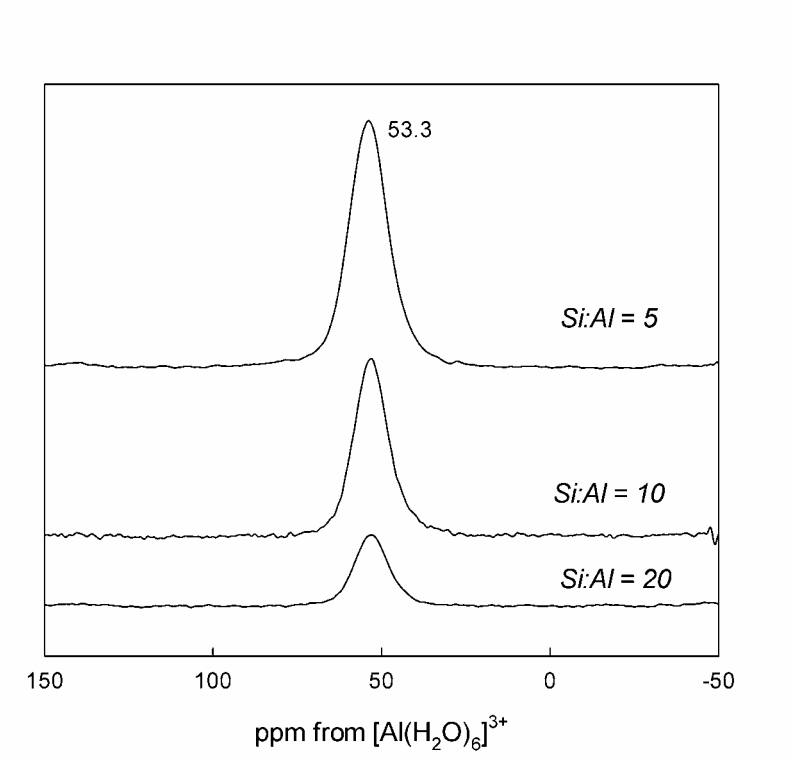

Figure S2. ^{27}Al MAS NMR spectra of Al-CH_2-CH_2-PMOs (as-synthesised) with different Si/Al ratios.

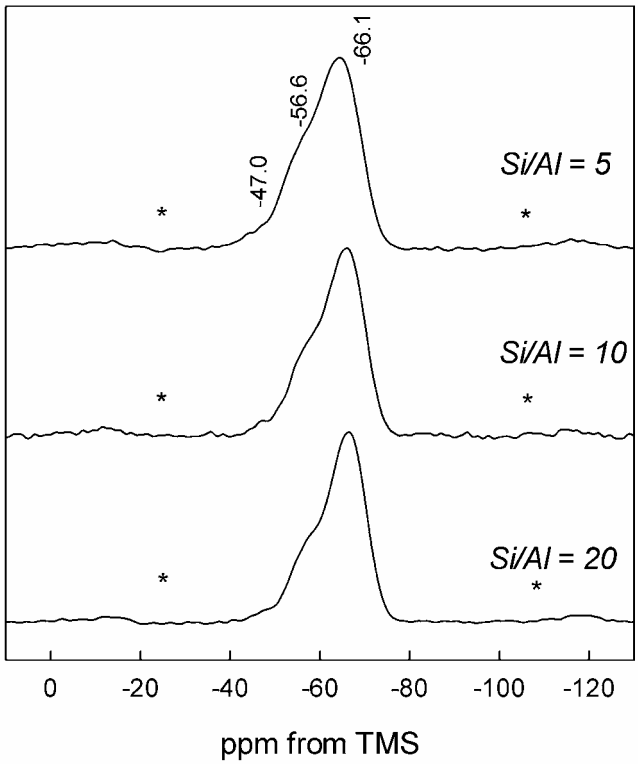

Figure S3. ^{1}H-^{29}Si MAS NMR spectra of as-synthesised Al-CH_2-CH_2-PMOs with different Si/Al ratios.

Identification of acidic sites by FTIR spectroscopy of adsorbed pyridine

The adsorption of pyridine was carried on the Al-CH_2-CH_2-PMO with different contents of Al. The solids were thermally treated at 150ºC for 24 hours before the adsorption of pyridine. The solids were pressed with KBr into the pellets (KBr was calcined at 550ºC for 24 hours before use). The spectra were recorded on a PerkinElmer FTIR spectrometer.

The spectra of pyridine adsorbed on a Al-CH_2-CH_2-PMOs show the presence of several bands. The lines at $1540_{(m.)}$ and $1640_{(m.)}$ cm^{-1} registered for the samples with different Al-contents are indicative of pyridine bound to Bronsted acidic sites, while the line at *ca*. $1490_{(s.)}$ cm^{-1} can be ascribed to the pyridine bound to both Bronsted and Lewis acidic sites. The intense peak at $1444_{(s.)}$ cm^{-1} is attributable to the H-bonded pyridine typical of the silica based molecular sieves.