Supporting information for

New organophilic kaolin clays based on single- point grafted 3-aminopropyl dimetylethoxysilane

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Introduction

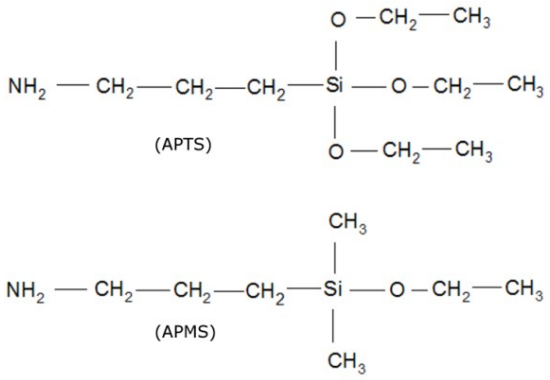

Fig. S1. The chemical structure of the 3-aminopropyl triethoxysilane (APTS) – the trifunctional silane and 3-aminopropyl dimethylethoxysilane (APMS) – the monofunctional silane

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Results and Discussion

Raw kaolin

TGA/DTG

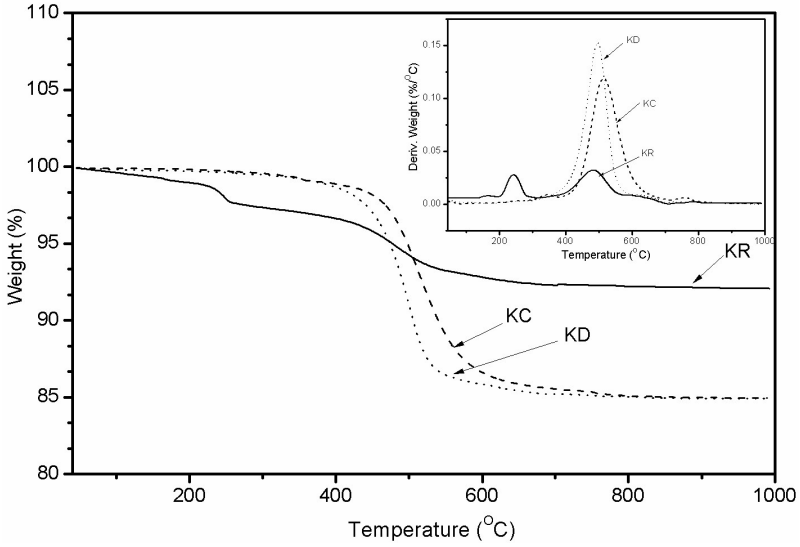

Fig S2 TGA curves/DTG inset of the three kaolin samples

According to KR thermogram, the curve displayed two important degradation stages, and traces of bounded water, from the heterogeneous oxide phases, of about 0.9 wt%. The first mass loss (i.e. 1.6 wt%) with the maximum degradation temperature at 244°C was attributed to the conversion of gibbsite into boehmite,[32] while the following, degradation step, with a maximum around 490°C (5.4 wt% loss) corresponded to - γ-AlOOH conversion into Al_2O_3.

FTIR

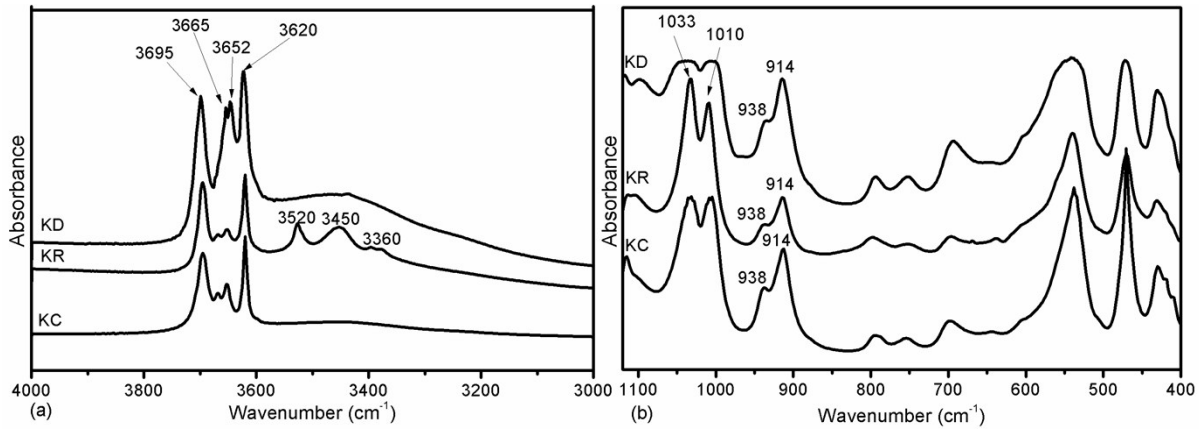

Fig S3. Infrared spectra of the three kaolin samples; (4000-3000cm^{-1}) **(a)** and (1150 – 450 cm^{-1}) **(b)** wavenumber ranges

The FTIR spectra of KR, KC and KD were similar, and agreed well with those reported in the literature.[24, 25, 27] The hydroxyl stretching region contained four characteristic bands for all three kaolin types (**Fig S3**a). Hence, the bands recorded at 3695 cm^{-1}, 3665 cm^{-1} and 3652 cm^{-1} were assigned to the ν_{O-H} vibration of inner hydroxyl surface (interlamellar) while the band at 3620 cm^{-1} was due to the ν_{O-H} vibration of inner hydroxyl groups (intralamellar).[33] The bands in the 1120-1000 cm^{-1} region were associated with three different Si-O-Si in plane stretching vibrations,[34] and the characteristic bands of the interlamellar and intralamellar aluminol groups (**Fig S3**b), can also be observed at 938 cm^{-1} and 914 cm^{-1}, respectively.[33,35]

X-ray

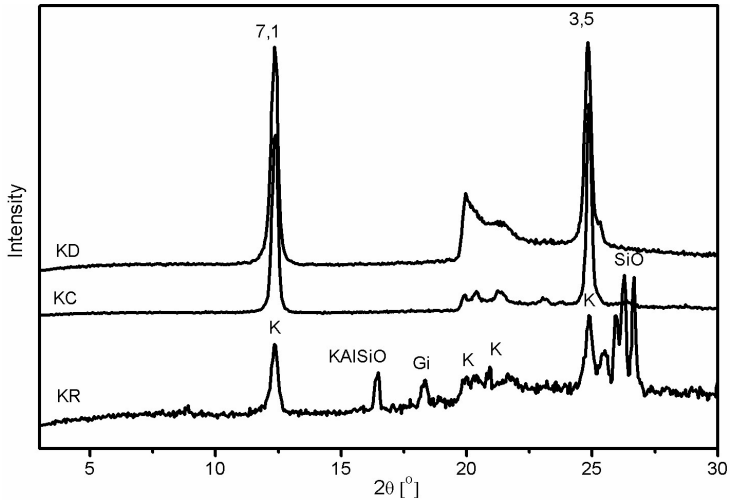

Fig S4. XRD patterns of the three kaolin samples

All samples displayed characteristic basal diffraction peaks at 7.1 Å and 3.5 Å, as literature reports.[36, 37]

DMSO - kaolinite intercalation

TGA / DTG

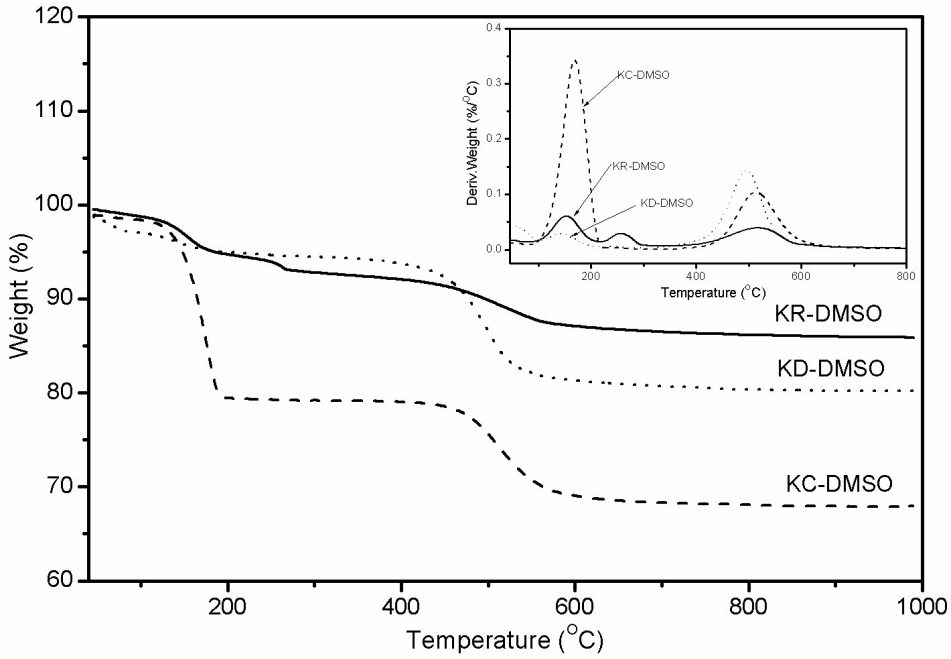

Fig S5. The TGA curves /DTG inset of the three DMSO-intercalated kaolin samples

FTIR

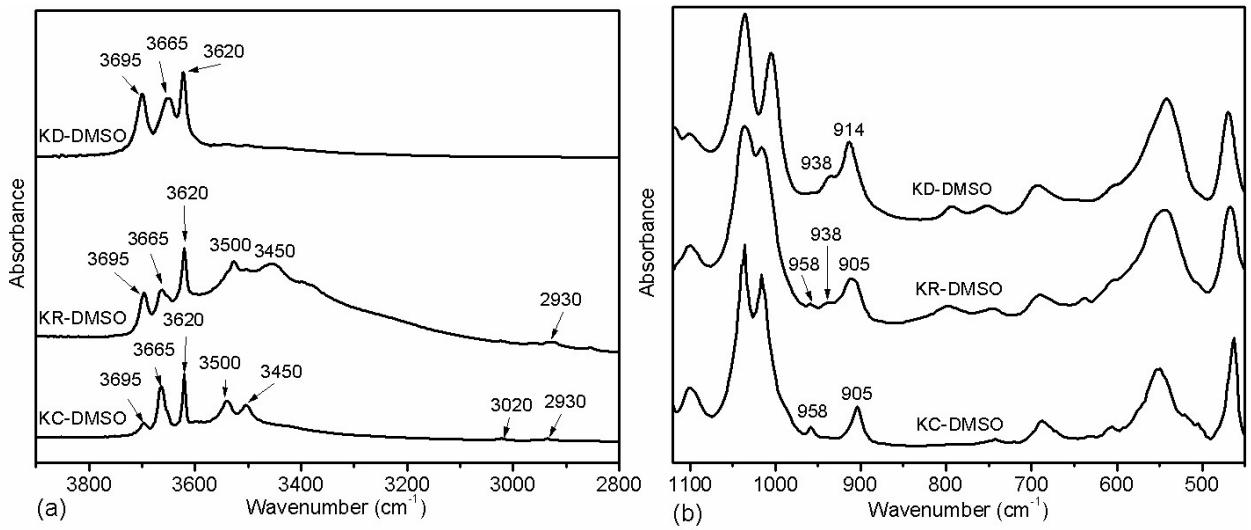

Fig S6. Infrared spectra of the three DMSO-intercalated kaolin samples; (4000-3000cm^{-1}) **(a)** and (1150 – 450 cm^{-1}) **(b)** wavenumber ranges

New bands, i.e. 3020 cm^{-1} and 2930 cm^{-1}, corresponding to ν_{CH3} reflected the presence of DMSO molecules in KC-DMSO and KR-DMSO samples (**Fig S6**a).[16, 21, 22-25,28]

X-Ray

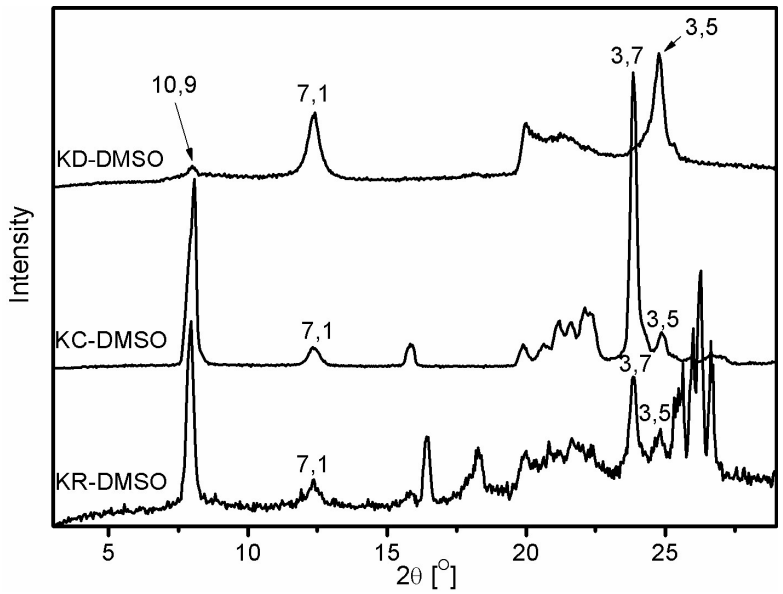

Fig S7. XRD patterns of the three DMSO-intercalated kaolin samples

Organophilization process

FTIR

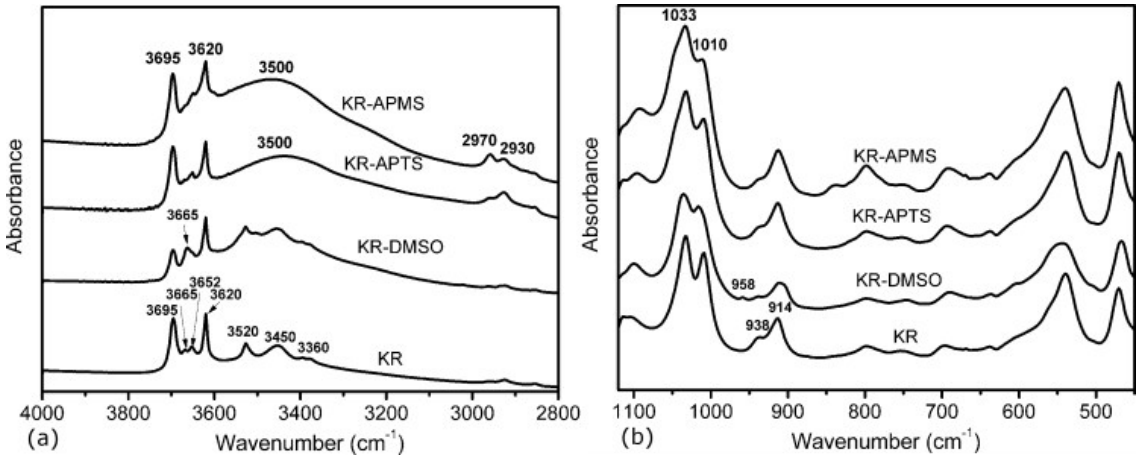

Figure S8. The infrared spectra of KR, KR-DMSO, KR-APTS and KR-APMS in the 4000-2800 cm^{-1}**(a)** and 1100-450 cm^{-1}**(b)** specific wavenumber range