

# The influence of particle size of amino-functionalized MCM-41 silicas on CO<sub>2</sub> adsorption

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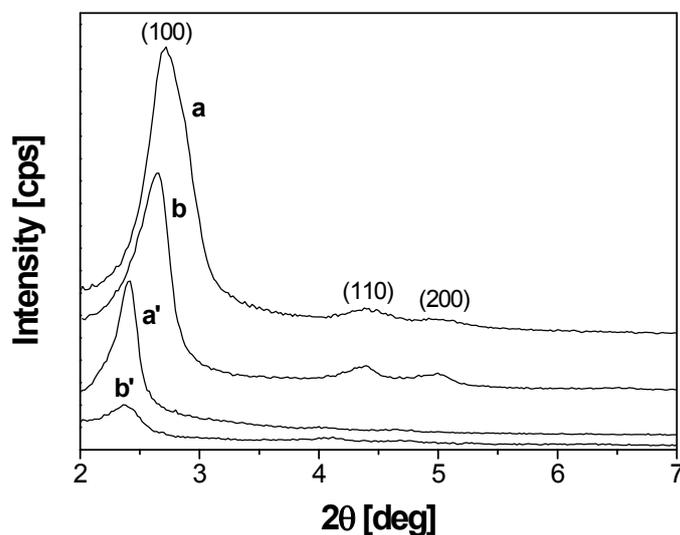
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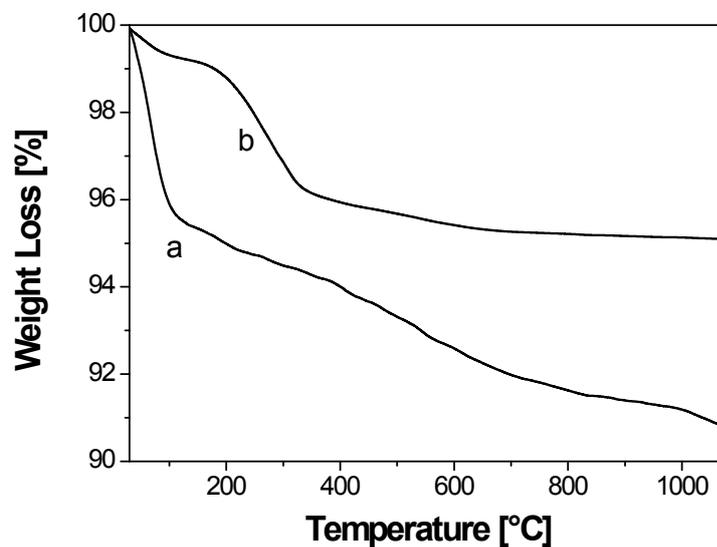
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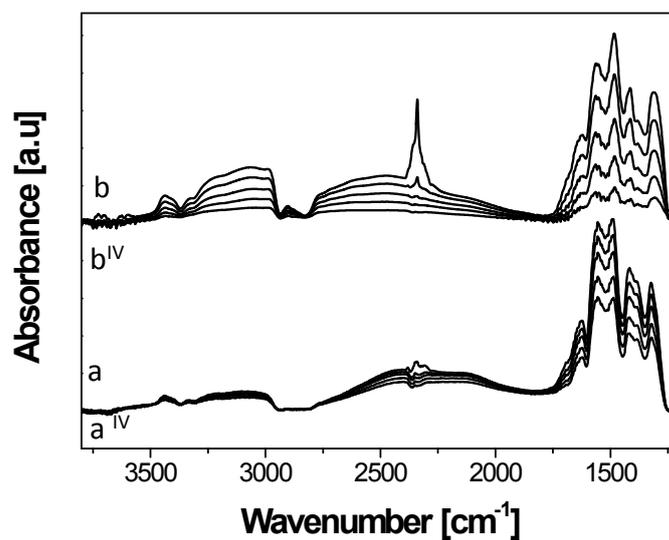
## Supporting Information



**Figure S.I.1.** XRD patterns between 2 and 7 °2θ of MCM-41 micro (a), MCM-41 nano (b), P\_MCM-41 micro (a') and P\_MCM-41 nano (b').



**Figure S.I.2.** TGA curves of MCM-41 micro (a), MCM-41 nano (b). The measurements were done under Argon flow (20 ml/min) from 20 to 1100°C (1°C min<sup>-1</sup> heating rate).



**Figure S.I.3.** FTIR spectra of CO<sub>2</sub> adsorbed (P<sub>max</sub> = 60 mbar) at 35°C on P\_MCM-41 micro (a-a<sup>IV</sup>) and P\_MCM-41 nano (b-b<sup>IV</sup>). The arrows indicate decreasing CO<sub>2</sub> pressure until vacuum. Spectra are reported after subtraction of the spectrum recorded before CO<sub>2</sub> interaction, used as a background.

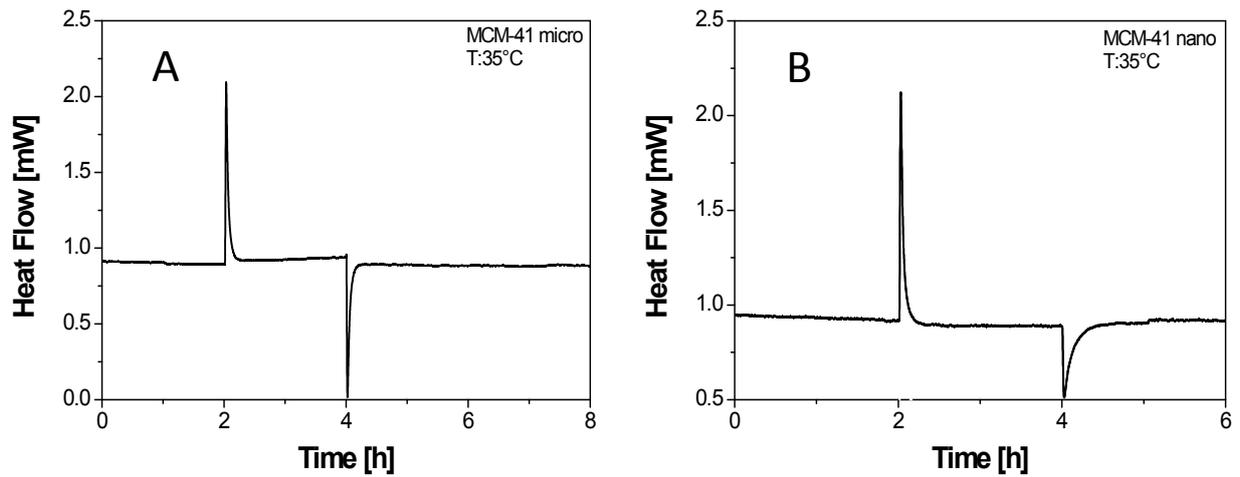


Figure S.I.4. Heat Flow from DSC-TGA Analysis for MCM-41 micro (Frame A) and MCM-41 nano (Frame B) samples.

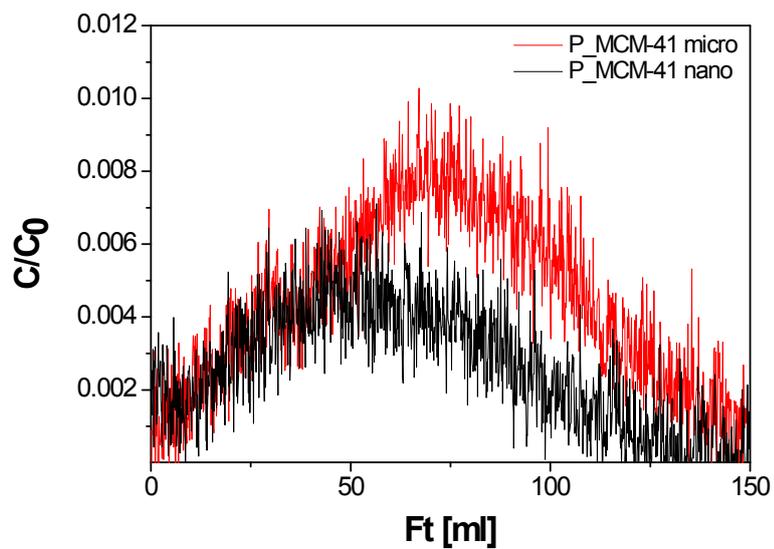


Figure S.I.5. TPD curves for P\_MCM-41 micro and P\_MCM-41 nano sample at 2 ml/min flow rates. CO<sub>2</sub> partial pressure: 0.1 bar.

Integrating the area under the TPD curves, the value of irreversible chemisorbed fraction can be achieved. The obtained values of irreversible fractions respectively for P\_MCM-41 micro and P\_MCM-41 nano samples are 0.16 and 0.06 mmol·g<sup>-1</sup>.

<b>Sample</b>	<b>TPD irreversible fraction [mmol/g]</b>	<b>TGA irreversible fraction [mmol/g]</b>	<b>Volumetry irreversible fraction [mmol/g]</b>
P_MCM-41 micro	0.16	0.16	0.16
P_MCM-41 nano	0.06	0.07	0.10

Table 1. Irreversible fractions obtained with TPD, TGA and Volumetric Analysis for the grafted MCM-41 materials.

<b>Sample / Temperature</b>	<b>CO<sub>2</sub> Adsorption Capacity [mmol/g]</b>	<b>reversible fraction [%]</b>	<b>irreversible fraction [%]</b>
P_MCM-41 micro / 20°C	0.63	64.9	35.1
P_MCM-41 micro / 35°C	0.60	72.8	27.2
P_MCM-41 micro / 50°C	0.58	78.6	21.4
P_MCM-41 micro / 70°C	0.55	86.6	13.4
P_MCM-41 micro / 90°C	0.49	93.3	6.7
P_MCM-41 nano / 20°C	0.96	87.4	12.6
P_MCM-41 nano / 35°C	0.79	90.7	9.3
P_MCM-41 nano / 50°C	0.60	95.4	4.6
P_MCM-41 nano / 70°C	0.38	96.0	4.0
P_MCM-41 nano / 90°C	0.21	99.1	0.9

Table 2. CO<sub>2</sub> Adsorption Capacity, reversible and irreversible fractions obtained with TGA analysis for the grafted MCM-41 materials.