SYNTHESIS AND CHARACTERIZATION OF MODIFIED ORDERED MESOPOROUS MATERIALS

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The family of mesoporous materials called M41S (MCM-41, MCM-48 and MCM-50) is a subject of growing interest since they were discovered by Mobil researchers in 1992 [1]. The synthesis of mesoporous materials is based on the formation of siliceous structures around template micelle assemblies.

The main properties of these materials are: i) very narrow pore size distribution in the mesoporous region, between 2 and 4 nm, ii) high specific surface area (1000-1500 m^2/g), iii) highly ordered structure and iv) active surface chemistry that allows an easy modification of the properties. All of them make these materials very attractive for numerous applications such as catalysis, encapsulation of molecules, sensors and separations.

The MCM-48 powders are synthesized as reported by Kim et al. [2].The aim of this work is the surface modification of the MCM-48 by silane coupling agents (figure 1) in order to obtain specific interactions between the analyte and the surface. The synthesis of modified MCM-48 layers would increase the selectivity to a certain analyte. It is well known that the amine group reacts with CO_2, which makes these devices suitable for sensing purposes on CO_2 controlled atmospheres, for example in the food industry. In this work we report the MCM-48 modification with 3-aminopropyl tri-etoxisilane (APTS).

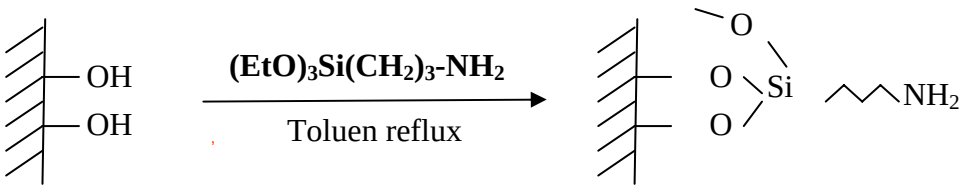

Figure 1. Post-grafting of MCM-48 with APTS

In order to control the loading rate several parameters of this method were studied: APTS concentration vs stoichiometric amount [3]., reaction temperature, reaction time and time of stirring at room temperature.

MCM-48 materials were characterized before and after modification with different techniques: XRD, N_2 adsorption, FTIR, TGA and elemental analysis.

References:

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[3] H. Landmesser, H. Kosslick, W. Storek and R. Fricke. Solid State Ionics 101-103, (1997) 271-277