SYNTHESIS AND CHARACTERIZATION OF IMIDAZOLIUM FUNCTIONALIZED SILICA BASED MESOPOROUS MATERIALS USING GLUTAMIC SURFACTANT WITH DIFFERENT LENGTH TAILS

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Mesoporous molecular materials attract Scientifics' interest due to many properties that confers to this material a huge field of applications. The applications of these materials fundamentally depends on the empty volume distribution, i.e. a pore size range from 2 to 50 nanometers, a regular spatial pore distribution, high specific area and pore volume, molecular polarity, size and the presence of boxes, canals.

The aim of this study is to synthesize other stable mesoporous materials with different porosity distribution. For this, we will use the co-structuring agent route, and anionic surfactants, which allows the exhaustive functionalization of the inner surface of the final porous material.

One manner to fine tune the applications of mesoporous materials based in silica is with the functionalization of the inner surface with an organic constituent with the goal of fine tune the interaction with specific samples or some polymeric matrix. In this case, the organic constituents used are imidazolium alkoxysilanes derivative groups as the co-structuring agent and glutamic surfactant with different length tails. According to the g-Parameter model[1], porosities with different curvature are supposed to be obtained. Hence, size, charge and shape of surfactants are important structure-determining parameters. Larger head-group surfactants are used with the objective to generate maximum surface curvature.

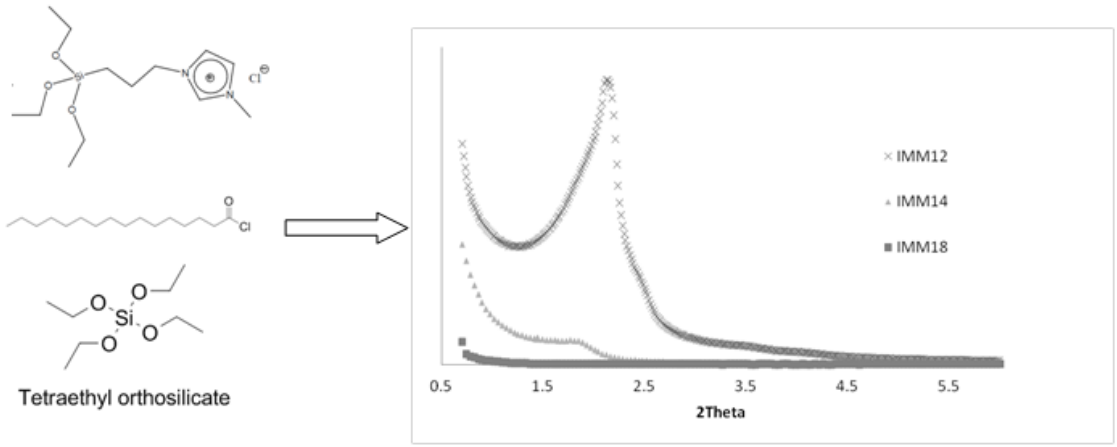

Fig.1- Synthesis of mesoporous materials with the co-structuring agent and glutamic surfactant and the obtained results.

Surface's functionalization using the co-condensation route permits the synthesis and polymerization of silica in a one stage reaction with organic groups uniformly distributed both inside the pores and over the surface[2]. On the contrary, grafting method only allows to organic group to be grafted in external surface and near pore entrance, involving problems as oligomerization at the pore entrance locking the pores[3].

The mesoporous material obtained with the co-condensation method will be characterized with a number of techniques such as X-Ray Diffraction, nuclear magnetic resonance, thermogravimetic analysis, N_2 adsorption and UV-vis spectroscopy.

Finally, we show the adsorption performance using several anionic dyes as adsorbates with different molecular size with a dual purpose, on one hand, to show their adsorption capacity, a useful parameter to decontaminate waste water from textile industry[4]. On the other, to characterize in a pretty realistic manner the window of access to the porous system loading the synthesized material with dyes and measuring the ability for different anions to displace the dye, which is then measured by UV-vis spectroscopy and representing an isothermal adsorption[5].

Referencias

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