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Synthesis of surface-functionalized silica mesophases containing ionic groups

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Silicate mesoporous materials have large surface area and high pore volume, tunable and uniquely distributed pore size within 2-50 nm and highly ordered mesostructures, and therefore they are expected to find applications in fields of adsorption, heterogeneous catalysis, electronics, separation and medicine.

The aim of my research is to investigate the synthesis of functionalized mesoporous silicas containing ionic groups from ionic organoalkoxysilane precursors. The synthesized material were investigated by various strategies

1.Ordered silica functionalized supported imidazolium species: - by co-condensation within the synthesis medium of the alkoxysilane precursor of the silica mesostructures and ionic organoalkoxysilane [1]as co-structure directing agent to obtain the functionalized material after one step. The characterization is made by Liquid state NMR, Mass spectroscopy and Nitrogen sorption.

2.Ordered silica functionalized supported Amine species: - by co-condensation within the synthesis medium of the alkoxysilane precursor of the silica mesostructures and organoalkoxysilane containing a cationic functional group [2] as co-structure directing agent in the presence of different types of anionic surfactants[3]as structure directing agent. The characterization is made by Infrared spectroscopy, Mass spectroscopy and Nitrogen sorption.

3.Postsynthetic functionalization of silicas (Grafting):- by grafting the surface of the functionalized silicas with acid containing imidazole. The characterization is made by Solid state NMR, Nitrogen sorption and Thermo gravimetric analysis (TGA).

We successfully synthesised functionalized mesoporous silicas with high surface area and large pore volume by different types of techniques. The surface properties of the materials were monitored via Nitrogen sorption and X-ray diffraction (XRD). The presence of ionic groups was proven via Solid state NMR, Nitrogen sorption and Thermo gravimetric analysis (TGA). .The formed materials will be tested for application in catalysis and separation.

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