

Different functionalization routes to fine-tune Periodic Mesoporous Organosilicas

Els De Canck, Dolores Esquivel and Pascal Van Der Voort

Center for Ordered Materials, Organometallics and Catalysis (COMOC), Dept. of Inorganic and Physical Chemistry, Ghent University, Krijgslaan 281-S3, 9000 Gent, Belgium

Periodic Mesoporous Organosilicas (PMOs) are a recent type of interesting hybrid materials that contain organic bridging groups into the inorganic silica framework. They are synthesized using a polysilsesquioxane as silica precursor and a template to introduce the porosity. These materials are extremely versatile due to an existing variety of organic bridges but also due to the possibility of (post-)modifying this organic moiety. Many publications have appeared on applying PMOs in adsorption, low-k and biomedical applications, chromatography, but also in the field of heterogeneous catalysis [1].

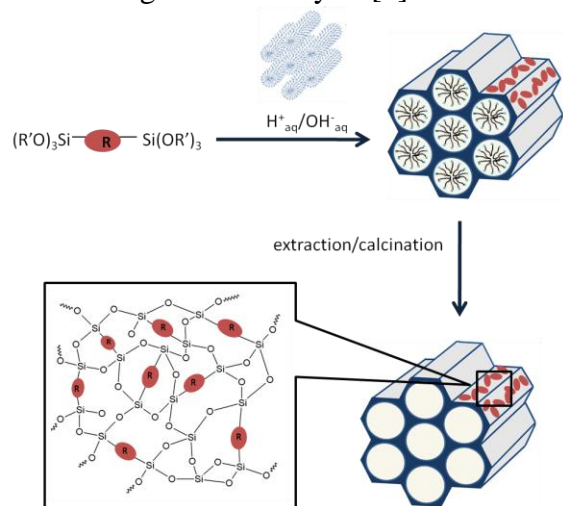
In this contribution, different pre- and post-synthetic routes are discussed to functionalize the ethylene bridges of a PMO material. These methods are designed to create C-C coupling of the functional group to the PMO and thus avoid the easily hydrolysable Si-O-Si bonds that are created by silylation. Following anchoring strategies will be discussed:

Pre-synthetic modification of the organosilane

- Via thiolene chemistry;

Post-synthetic modification of the PMO

- Via a Diels Alder reaction with different dienes [2];
- Via a nucleophilic substitution with various reagents [3];



Depending of the functionality attached to the material, these materials have been used for catalysis (Esterification, Aldol and Knoevenagel Condensation) and for adsorption. We will present some case studies to illustrate this.

[1] Van Der Voort, P., Esquivel, D., De Canck, E., Goethals, F., Van Driessche, I., Romero-Salguero, F.J., Chem. Soc. Rev., DOI:10.1039/C2CS35222B.

[2] Esquivel, D., De Canck, E., Jiménez-Sanchidrián, C., Van Der Voort, P., Romero-Salguero, F. J., J. Mater. Chem. 21 (2011) 10990.

[3] De Canck, E., Lapeire, L., De Clercq, J., Verpoort, F., Van Der Voort, P., Langmuir 26 (2010), 10076.

E-mail: Els.DeCanck@UGent.be; www: <http://www.we06.ugent.be/comoc>