Practical Information

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Versatile Periodic Mesoporous Organosilicas: Ideal Supports for the Heterogenization of Catalysts

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Periodic Mesoporous Organosilicas (PMOs) are a novel type of interesting hybrid materials that combine organic bridging groups with an inorganic silica framework. They are synthesized using a polysilsesquioxane as silica precursor and a template to introduce the porosity (Fig. 1). 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.

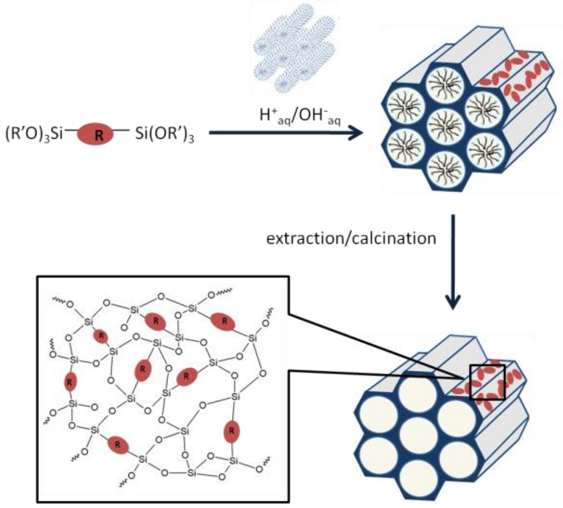

Fig. 1. Schematic representation of a general PMO synthesis.

Many publications have appeared on applying PMOs in adsorption, low-*k* and biomedical applications, chromatography, but also in the field of catalysis where these materials can act as interesting stable catalytic supports.[1] The heterogenization of metal complexes is of great environmental and economic importance as expensive catalysts can be easily separated from the reaction mixture and especially reused several times.

Recently, our research group developed two PMO materials, containing thiol and dangling allyl functionalities, which are very suitable for post-modification procedures.[2-3] Both functions can be easily and straightforward functionalized using “click reactions”. Furthermore, the allyl bearing PMO showed remarkable hydrothermal stability, also in basic environment. Therefore, these PMOs are ideal candidates for the heterogenization of interesting catalytic metal complexes such as Au, Pd, Ru, Rh, etc. and especially when regeneration of the solid catalyst is required.

In this contribution, we present post-synthetic routes to functionalize the organic bridges of the PMO materials and attach very active NHC-based gold(I) catalysts to this support. The functionalization methods are designed to create a stable coupling of the catalyst to the solid support. Furthermore, thorough characterization and catalytic results are discussed.

[1] Van Der Voort, P., Esquivel, D., De Canck, E., Goethals, F., Van Driessche, I., Romero-Salguero, F.J., Chem. Soc. Rev. 42 (2013) 3913-3955.
[2] Esquivel, D., van den Berg, O., Romero-Salguero, F.J., Du Prez, F., Van Der Voort, P., Chem. Commun. 49 (2013), 2344-2346.
[3] Ide, M., De Canck, E., Van Driessche, I.; Lynen, F., Van Der Voort, P., RSC Adv. 5 (2015), 5546-5552.

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