

Title	Mesoporous polymer catalysts for heterogeneous catalysis
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Project description:

It has been recently discovered that during the polymerization of vinyl monomers carried out at high monomers' dilution and with the molar fraction of the cross-linker is 50 % or more microsyneresis produces an unprecedented texture of the afforded resins (μ -resins), which combines high specific surface area, high pore volume and high pore diameter, and should be particularly fit to catalytic applications. We are currently investigating on their use as scaffolds for heterogeneous metal catalysts in the direct synthesis of H_2O_2 and in the oxidation of alcohols. These scaffolds can be chemically modified to tune their hydro-philic/phobic character to different reaction conditions. Engagement in this project will give to graduate students the chance to develop a wide array of skills which will be helpful not only in the field of heterogeneous catalysis, but also in solid state supported chemistry in general. In particular the work will range from the polymer synthesis, functionalization and characterization, to the preparation of the catalysts, the set-up of analytical methods for the analysis (GC, HPLC, NMR) of the reaction mixtures from catalytic experiments and to catalysts' testing. Both room-to-middle pressure batch autoclaves and flow reactors are available in our laboratory. Inverse Steric Exclusion Chromatography (ISEC) is also available: it is currently the most powerful tool for the characterization of the texture of organic polymeric materials in the swollen state, strictly relevant to the conditions of L-S catalysis, in which conventional dry-state techniques (e.g. gas physisorption) fail.

Publications:

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- S. Sterchele, P. Biasi, P. Centomo, A. Shchukarev, K. Kordás, A.-R. Rautio, J.-P. Mikkola, T. Salmi, P. Canton, M. Zecca, *ChemCatChem* 8 (2016) 1564–1574.
- S. Martinuzzi, D. Cozzula, P. Centomo, M. Zecca, T.E. Müller, *RSC Adv.* 5 (2015) 56181–56188.
- N. Gemo, S. Sterchele, P. Biasi, P. Centomo, P. Canu, M. Zecca, A. Shchukarev, K. Kordás, T.O. Salmi, J.-P. Mikkola, *Catal. Sci. Technol.* 5 (2015) 3545–3555.
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- S. Sterchele, P. Centomo, M. Zecca, L. Hanková, K. Jeřábek, *Microp. Mesop. Mat.* 185 (2014) 26–29.

Collaborations/Network:

Dr. K. Jeřábek - Academy of Science of the Czech Republic, Prague, expert of textural analysis of polymeric materials (including ISEC) and of their application in catalysis.

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