Nejvýznamnější práce

1. M. Opanasenko, W. O. Parker Jr., M. Shamzhy, E. Montanari, M. Bellettato, M. Mazur, R. Millini, J. Čejka. Hierarchical hybrid organic-inorganic materials with tunable textural properties obtained using zeolitic layered precursor. J. Am. Chem. Soc. 136 (2014) 2511 – 2519

Novel porous pillared materials containing organic linkers or polyhedral oligomeric siloxane covalently bonded to zeolitic layers were obtained from zeolite lamellas prepared by a top-down procedure. Obtained materials exhibited a mesoporous or hierarchical micro-/mesoporous system with excellent textural characteristics (S_{BET} > 1000 m^2/g, V_{micro} > 0.3 cm^3/g, V_{total} > 1 cm^3/g). The hybrids exhibited thermal stability up to 350 °C. Textural properties of the formed zeolitic organic–inorganic materials can be controlled by varying the linker or synthetic conditions over a broad range. Potentially, the functionalization of such materials allows to obtain catalytically active materials with easily tunable properties and can open the way to new shape-selective materials for sorption/catalytic applications.

2. M. Opanasenko, A. Dhakshinamoorthy, M. Shamzhy, P. Nachtigall, M. Horaček, H. Garcia and J. Čejka. Comparison of the Catalytic Activity of MOFs and Zeolites in Knoevenagel Condensation. Catal. Sci. Technol. 3 (2013) 500–507

The catalytic behavior of representative metal-organic frameworks (MOFs) was investigated in Knoevenagel condensation of cyclohexane carbaldehyde and benzaldehyde with active methylene compounds and compared with that of conventional materials (zeolites). Unexpectedly high yields were achieved over the MOF catalyst in the Knoevenagel condensation involving malononitrile, especially at a relatively low reaction temperature. Proposed mechanism of activation of malononitrile on a pair of adjacent Cu ions to explain the high catalytic activity of CuBTC with respect to conventional catalysts was the basis for the further deep investigations in this area.

3. V. Kasneryk, M. Shamzhy, M. Opanasenko, S. A. Morris, S. Russell, A. Mayoral, J. Čejka, R. E. Morris. Expansion of the ADOR strategy for the synthesis of new zeolites: The synthesis of IPC-12 from zeolite UOV. Angew. Chem. Int. Ed. 56 (2017) 4324–4327

The assembly–disassembly–organization–reassembly (ADOR) process has been used to disassemble a parent zeolite with the UOV structure type and then reassemble the resulting layers into a novel structure, IPC-12. The structure of the material has previously been predicted computationally and confirmed in our experiments using X-ray diffraction and atomic resolution STEM-HAADF electron microscopy. This was the first successful application of the ADOR process to a material with porous layers.