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REGIONAL CENTRE OF ADVANCED TECHNOLOGIES AND MATERIALS

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Seminar room of RCPTM (room No. 314), Šlechtitelů 11, Olomouc

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„Nanocasting-based strategies to prepare bimodal micro-mesoporous carbons"

Abstract: Carbon materials with well-defined bimodal micro-mesopore size distributions offer two important prospective advantages over more conventional porous carbons: good transport of molecules through the mesopores, and high surface area conferred by the micropores. This lecture will discuss and compare the results from different strategies we have followed to prepare carbon materials with bimodal pore size distributions, having as a point in common the use of the templating technique to control porosity. The first strategy to be examined is the development of micropores by activation of ordered mesoporous carbons. In this method, the mesopore structure can be adjusted through selection of a mesoporous template, whereas microporosity is set through precise control of the conditions of either chemical or physical activation. The main problem we encountered with this method was the gradual deterioration of the ordered mesopore structure upon activation. To overcome this limitation we proposed a novel method, consisting of the direct activation of the carbon/silica composite. During the activation process, the template protected the ordered mesoporous carbon structure, which afforded us the use of higher proportions of activating agent. This resulted in further microporosity development without collapse of the structure. Another strategy to be described is the replica of hierarchical inorganic solids, and involves a preliminary stage of preparation of micro-mesoporous templates. To this end, we synthesized bimodal aluminosilicates by soft- templating ordered mesoporous silicas in the presence of zeolite particles dispersed in the reaction medium. Subsequently, these bimodal aluminosilicates were infiltrated by chemical vapor deposition of acetylene or propylene, which allowed us to successfully replicate both the mesoporosity and microporosity in the resulting carbonaceous materials.