

Diffusion in nanoporous materials.

Experimental study using pulsed field gradient NMR method

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In the present contribution we discuss some aspects of diffusion processes in nanoporous materials as probed using the pulsed field gradient (PFG) NMR method. The first part concerns with the self-diffusion of organic molecules on porous silicon surface as a function of the surface coverage. The measured self-diffusion coefficient is found to strongly increase with increasing surface loading. This observation is attributed to the occurrence of activated diffusion on a heterogeneous surface and reveals prevailing character of the adsorbate-adsorbent interaction as compared to the adsorbate-adsorbate one. It is anticipated that in this way a complete reconstruction of the surface energetic properties is possible. In the second part, some details of the molecular diffusion process in a porous material having bimodal character of the pore size distribution are presented. The observed complex behaviour of the scattering function measured by the PFG NMR method is correlated with a transient character of the molecular transport in the bi-porous host material.