

Perspectives on Diffusion in Nanoporous Materials: Reasons to Study Diffusion

Irrespective of the fact that after the introduction of pulsed field gradient NMR to zeolite science and technology a number of hidden pitfalls in diffusion measurement could be identified, for a number of systems different techniques still provide seemingly contradictory information about the molecular mobility in the interior of nanoporous materials. The clarification of this discrepancy is complicated by the fact that different measuring techniques may refer to different space and time scales as well as to different physical situation. On the basis of the following table this aspect shall be outlined in some more detail. In close relation to this, an overview of a current initiative, jointly supported by CNRS (France), DFG and EPSRC (UK), shall be given, to eventually clarify this long-lasting problem by the cooperation of an international researcher group. The techniques printed in bold are available within this consortium. Some aspects of these techniques, together with most recent results, shall be given during the subsequent presentations.

	Non-Equilibrium		Equilibrium
	transient	Stationary	
macroscopic	Sorption/Desorption Frequency Response Zero Length Column IR-FR Positron Emission Profiling (PEP) Temporal Product Analysis (TAP) IR Spectroscopy	Membrane-Permeation Effectiveness Factor in Chemical Reactions]	Tracer Sorption/Desorption Tracer ZLC
mesoscopic	IR Microscopy	Single-Crystal-Permeation]	Tracer-IR-Microscopy
microscopic	Interference Microscopy		Pulsed Field Gradient NMR (PFG NMR) Stray Field Gradient NMR (SFG NMR) Quasi-Elastic Neutron Scattering (QENS)