

## **NMR magnetization transfer as a tool for characterization of nanoporous materials**

Valiullin R., Furó I., Skirda V., Kortunov P.  
*Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia*

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### **Abstract**

The application of nuclear magnetic resonance magnetization transfer experiments to probe the surface-to-volume ratio and pore morphology of porous materials with characteristic pore sizes of 1-100 nm is described. The method is based on the phenomenon of incomplete freezing of liquids in small pores where a few monolayers adjacent to the pore walls remain liquid. Sufficient difference between the transverse relaxation times in the solid frozen core and liquid surface layer allows the initial preparation and subsequent re-equilibration of a solid-liquid magnetization grating. The method is demonstrated using model nanoporous materials with known characteristics. The ensuing problems of the mechanism of the magnetization transfer through the interface and within the frozen core are discussed and elucidated by pulsed-field-gradient NMR experiments. © 2003 Elsevier Science Inc. All rights reserved.

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### **Keywords**

Magnetization transfer, Nanoporous materials, Pulsed-field-gradient NMR