

Field-gradient NMR diffusometry in poly(ethylene oxide) melts confined to nanoscopic pores of solid methacrylate matrices

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Abstract

Depending on the choice of matrix constituents, the diameters of strands of linear, monodisperse poly(ethylene oxide) confined to nanoscopic pores of cross-linked methacrylate matrices can be varied considerably. The samples were characterized by DSC, TEM, SEM and fringe field-gradient NMR diffusometry with respect to the strand diameter. A formalism evaluating diffusive spin echo attenuation curves based on the tube/reptation model allows the determination of the strand diameter. Values in the range 8-58 nm were found in accordance with TEM and SEM micrographs of shadow-cast freeze-fractured surfaces of the samples. © 2005 Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.mri.2004.11.035>

Keywords

Diffusometry, NMR, Poly(ethylene oxide), Pore confinement, Reptation