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Water transbilayer diffusion in macroscopically oriented lipid bilayers as studied by pulsed field gradient NMR

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Abstract

Water self-diffusion in lipid bilayers macroscopically oriented on glass plates was studied by pulsed field gradient ^1H nuclear magnetic resonance technique. Diffusion decays were multicomponent with a distribution of diffusion coefficients ranging from about 10^{-10} to about 10^{-13} m^2/s . A number of measurements with variations of the sample orientation, diffusion time and the distance between the glass plates showed that the "fast" component of diffusion corresponds to water in the bilayer "cracks". The "slow" component of diffusion corresponds to transbilayer water diffusion in the long-diffusion-time regime. For a more reliable separation of parts corresponding to fast and slow diffusion of water, a "component-resolved spectroscopy" method for the global analysis of correlated spectral data (P. Stilbs, K. Paulsen, P.C. Griffiths: *J. Phys. Chem.* 100, 8180, 1996) was applied. © Springer-Verlag 2005.
