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Studies of molecular diffusion in single-supported bilayer lipid membranes at high hydration by quasielastic neutron scattering[1] M. BAI, A. MISKOWIEC, S.-K. WANG, H. TAUB, U. Mo., F.Y. HANSEN, Tech. U. Denmark, T. JENKINS, M. TYAGI, D.A. NEUMANN, NIST, S.O. DIALLO, E. MAMONTOV, K.W. HERWIG, ORNL — Bilayer lipid membranes supported on a solid surface are attractive model systems for understanding the structure and dynamics of more complex biological membranes that form the outer boundary of living cells. We have recently obtained quasielastic neutron spectra from single-supported bilayer lipid membranes using the backscattering spectrometer BASIS at the Spallation Neutron Source. Protonated DMPC membranes were deposited onto SiO_2-coated Si(100) substrates and characterized by AFM. Analysis of their neutron spectra shows evidence of a relatively broad Lorentzian component that we associate with bulk-like water above a freezing temperature of $\sim$267 K. At lower temperatures, the spectra differ qualitatively from that of bulk supercooled water, a behavior that we attribute to water bound to the membrane. We also find evidence of a narrow Lorentzian component that we tentatively identify with a slower motion (time scale $\sim$1 ns) associated with conformational changes of the alkyl tails of the lipid molecules.

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