Abstract Submitted
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Studies of molecular diffusion in single-supported bilayer lipid membranes at low hydration by quasielastic neutron scattering[1] A. MISKOWIEC, M. BAI, M. LEVER, 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 — We have extended our investigation of the quasielastic neutron scattering from single-supported bilayer lipid membranes to a sample of lower hydration using the backscattering spectrometer BASIS at the SNS of ORNL. To focus on the diffusive motion of the water, tail-deuterated DMPC membranes were deposited onto SiO_2-coated Si(100) substrates and characterized by AFM. Compared to a sample of higher hydration, the dryer sample does not have a step-like freezing transition at ∼267 K and shows less intensity at higher temperatures of a broad Lorentzian component representing bulk-like water. However, the broad component of the "wet" and "dry" samples behaves similarly at lower temperatures. The dryer sample also shows evidence of a narrow Lorentzian component that has a different temperature dependence than that attributed to conformational changes of the alkyl tails of the lipid molecules in the wet sample. We tentatively identify this slower diffusive motion (time scale ∼1 ns) with water more tightly bound to the membrane.

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