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Temperature-dependent neutron diffraction measurements from D_2O hydrating single-supported lipid bilayers of DMPC[1] Z. N. BUCK, J. TORRES, A. MAZZA, H. KAISER, H. TAUB, Univ. of Missouri - Columbia, F. Y. HANSEN, Technical University of Denmark, A. MISKOWIEC , Oak Ridge National Lab, M. TYAGI, NIST Center for Neutron Research — The freezing point depression of water associated with biological membranes, studied principally by NMR, has been of interest for decades. Here we have used neutron diffraction measurements at the University of Missouri Research Reactor (MURR) to investigate the freezing behavior of water associated with single-supported zwitterionic lipid bilayers composed of DMPC. Diffraction patterns obtained as a function of temperature reveal that water freezes abruptly into its hexagonal phase at 270 K with no evidence of amorphous ice. Following the initial crystallization of the membrane-associated water there is a region of continuous hexagonal crystal growth, which is believed to occur in the interfacial water closest to the membrane. The temperature-dependent intensity of the observed Bragg peaks have been compared with that of incoherently elastically-scattered neutrons collected on the High-Flux Backscattering Spectrometer at NIST from an identical sample hydrated with H_2O [2]. We find excellent agreement between the two data sets, suggesting the absence of amorphous solid water and that all the water hydrating a DMPC membrane eventually freezes into the hexagonal crystalline phase. [2]M. Bai *et al.*, Europhys. Lett. **98**, 48006 (2012).

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