Abstract Submitted
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Continuous freezing and melting of water in proximity to nanostructured CuO coatings.[1] J. TORRES, Z. N. BUCK, H. KAISER, R. A. WINHOLTZ, H. TAUB, T. TUMLIN, A. AL-WAHISH, U. of Missouri, Columbia, M. TYAGI, NIST Center for Neutron Research, F. Y. HANSEN, Technical University of Denmark — Nanostructured CuO coatings have been used to enhance the performance of heat transfer devices such as oscillating heat pipes.[2] Scanning electron microscope images of these coatings show sharp, blade-like features $1-3\ \mu$ in length[3] yielding surfaces of high hydrophilicity. To assess the strength of the CuO/H_2O interaction, we have investigated the freezing/melting behavior of H_2O in proximity to these surfaces. Using the backscattering spectrometer (HFBS) at the NIST Center for Neutron Research, we have measured the intensity of neutrons scattered elastically from a well-hydrated sample of CuO-coated Cu foils as a function of temperature. We find that all of the water freezes continuously over the range 280 K to 200 K, suggesting the formation of amorphous ice. In addition, preliminary quasielastic spectra at 250 K show broadening at all Q values, indicating slower dynamics than for bulk supercooled water at this temperature. Neutron diffraction measurements are in progress at the University of Missouri Research Reactor to confirm the absence of hexagonal ice Bragg peaks as we have been found for well-hydrated single-supported bilayer membranes (DMPC).[4] [2]F. Z. Zhang *et al.*, J. Heat Transfer **138**, 062901 (2016). [3]Y. Nam and Y. S. Ju, J. Adhesion Science and Technology **27**, 2163 (2013). [4]M. Bai *et al.*, EPL **98**, 48006 (2012); Miskowiec *et al.*, EPL **107**, 28008 (2014).

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