Abstract Submitted
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Neutron scattering study of the freezing of water near a cupric oxide surface[1] J. TORRES, Z. N. BUCK, F. Z. ZHANG, T. CHEN, R. A. WINHOLTZ, H. KAISER, H. B. MA, H. TAUB, U. Mo., M. TYAGI, NIST — Oscillating heat pipes (OHP) offer promising two-phase heat transfer for a variety of applications, including cooling of electronic devices.[2] Recently, it has been shown that a hydrophilic CuO coating on either the evaporator or condenser sections of a flat-plate OHP can significantly enhance its thermal performance.[3] This finding has motivated us to assess the strength of the CuO/H_2O interaction by investigating the freezing behavior of H_2O in proximity to a CuO surface. Using the High-Flux Backscattering Spectrometer at NIST, we have measured the intensity of neutrons scattered elastically from a well-hydrated sample of CuO-coated Cu foils that mimic the oxide surfaces in a flat-plate OHP. We observe abrupt freezing of bulk-like H_2O above the CuO surface at 270 K followed by continuous freezing of the interfacial H_2O down to 265 K. This freezing behavior is qualitatively similar to that found for water near a zwitterionic single-supported bilayer lipid membrane.[3] Further studies are planned to compare the diffusion coefficients of the interfacial water for the coated and uncoated OHPs.[2] [2]F. Z. Zhang *et al.*, submitted to J. Heat Transfer. [3]M. Bai *et al.*, Europhys. Lett. **98**, 48006 (2012); Miskowiec *et al.*, Europhys. Lett. **107**, 28008 (2014).

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