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Using nanoscale amorphous solid water films to create and study deeply supercooled liquid water at interfaces

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Molecular beam vapor deposition of water on cryogenic substrates is known to produce amorphous solid films. When heated above their glass transition these films transform into deeply supercooled liquid water. These nanoscale liquid films can be used to study kinetic processes such as diffusion, isotope exchange, crystallization, and solvent mediated reactions in unprecedented detail. This talk will highlight our recent advances in this area. My colleagues Yuntao Xu, Chunqing Yuan, Collin Dibble, R. Scott Smith, Nick Petrik, and Greg Kimmel made important contributions to this work.This work was supported by the U.S. Department of Energy (DOE), Office of Science, Office of Basic Energy Sciences, Division of Chemical Sciences, Geosciences, and Biosciences. The research was performed using EMSL, a national scientific user facility sponsored by DOE's Office of Biological and Environmental Research and located at Pacific Northwest National Laboratory, which is operated by Battelle, operated for the U.S. DOE under Contract DE-AC05-76RL01830.