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Thermodynamic and Neutron Scattering Investigation of Ethylene Wetting on MgO (100) ANDI BARBOUR, University of Tennessee, CRAIG BROWN, NIST Center for Neutron Research, J. Z. LARESE, Oak Ridge National Laboratory and University of Tennessee — The adsorption properties of a molecular film on a solid substrate are governed by the relative strength of the molecule-substrate versus molecule-molecule interaction. The wetting properties of ethylene (C_2H_4) molecular thin films on graphite are of fundamental interest because the number of observed adlayers increases as the isothermal temperature increases with T$\leq$104K (bulk triple point). In adsorbate/substrate systems like C_2H_4/graphite, it is accepted that triple point wetting occurs. For our studies, we employed MgO nanocubes because they represent a prototypical metal oxide with a wide variety of technological uses including catalyst support. Of particular interest are wetting/layering transitions and the changes that take place in the neighborhood of the bulk triple point. We report our experimental investigation of the adsorption behavior of evidence C_2H_4 on MgO (100) using high-precision adsorption isotherms and neutron diffraction and scattering. We demonstrate the dominate role that molecule-molecule interaction plays in the wetting phenomena by comparing the behavior of ethylene on graphite and MgO. U.S. Department of Energy (DE-AC05-00OR22725) at ORNL managed and operated by UT-Battelle, LLC, and the NSF (DMR-0412231).

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