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Tribological properties of self-assembled monolayers in humid environments CHRISTIAN D. LORENZ, EDMUND B. WEBB III, MICHAEL E. CHANDROSS, MARK J. STEVENS, GARY S. GREST, Sandia National Laboratories — Microelectromechanical systems (MEMS) are a rapidly growing area of technology. Due to the large surface area to volume ratio in MEMS, surface forces including friction and adhesion are tribological limitations that affect their performance. Self-assembled monolayer (SAM) coatings, which have high hydrophobicity, low surface energies and compact packing structures, are good canditates for MEMS lubrication. Large scale molecular dynamics simulations are used to study the frictional and adhesive behavior of hydrocarbon and fluorocarbon SAMs coatings on amorphous silica in the presence of water. The systems consist of SAMS with a chain length of 11 carbons physisorbed to the amorphous silica substrate with the water placed between the SAMs and the substrate. Humidity has no observed effect on the maximum adhesion of either of the SAMs. The coefficient of friction decreases with increasing water, which is in agreement with what is observed experimentally. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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