

Abstract Submitted
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Ultra-high vacuum cryotribology of diamond and diamond-like films MATTHEW AGGLETON, P. TABOREK, University of California, Irvine — We have used a sliding block tribometer (described in J.C. Burton, P. Taborek, and J.E. Rutledge, TRIBOLOGY LETTERS 23, 131, 2006) to measure the temperature dependence of the kinetic friction coefficient of single crystal diamond on various types of CVD diamond films including microcrystalline diamond, nanocrystalline diamond, and diamond-like carbon. We have also studied various other solid and fluid lubricants. These measurements have been performed in ultra-high vacuum and at temperatures ranging from 6 to 300 Kelvin. Although microcrystalline diamond has a low friction coefficient in air; in vacuum, the friction coefficient rises to approximately 0.7 and is independent of temperature. Nanocrystalline diamond is a much better tribological material in vacuum, particularly for $T > 240\text{K}$. Near 240K there is a reversible transition to a higher friction state. We will discuss the correlation between the tribological properties and the material properties such as sp²/sp³ ratio, hydrogen content, and grain size. This work is supported by Extreme Friction: MURI AFOSR # FA9550-04-1-0381

Matthew Aggleton
University of California, Irvine

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