

Quantitative friction force microscopy for nanoscale analysis of structural, mechanical, and chemical surface properties

Robert W. Carpick

*Assistant Professor, Engineering Physics Department, University of Wisconsin – Madison
1500 Engineering Dr., Madison, WI, 53706, USA
carpick@engr.wisc.edu*

Friction force microscopy (FFM) allows one to probe energy dissipation down to the nanometer scale. This offers tremendous potential to unravel the origins of friction forces, which in general are poorly understood and controlled. This is particularly critical for micro- and nano-scale devices, since friction forces and the related phenomena of adhesion and wear can cripple their operation. In addition, the friction force has been shown to be highly sensitive to other material properties, including elastic, viscoelastic and plastic response, adhesion, material defects, surface/interface chemistry, and structural anisotropy. In this talk, I will discuss the range of properties that contribute to friction and can, in principle, be probed using FFM. I will highlight key instrumental and analytical challenges that must be addressed to unravel and quantify these properties.