Friction force microscopy of shear planes at the electrochemical interface

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Friction force microscopy offers the opportunity to study molecular mechanisms of shear at electrochemically active solid-liquid interfaces. One of the key questions in understanding and controlling friction is the identification of the actual shear plane. We will discuss results of two experimental studies which demonstrate how the shear plane may vary within one experiment. In the first system, an ionic liquid on a crystalline gold electrode, the number of layers of ionic liquid between sliding tip and surface depends on the applied potential. [1] In the second system, a metallic glass surface corroded in a phosphate buffer, the sliding tip removes a precipitated layer of corrosion products even at lowest forces. This removal process intermittently contributes to the measured friction force. [2]

1. Kramer, G.; Bennewitz, R., Molecular Rheology of a Nanometer-Confined Ionic Liquid. *Journal of Physical Chemistry C* **2019,** *123* (46), 28284-28290.
2. Ma, H.; Bennewitz, R., Nanoscale friction and growth of surface oxides on a metallic glass under electrochemical polarization. *Tribol. Int.* **2021,** *158*, 106925.