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**The Tribological Properties of Nanocrystalline Metals** MICHAEL CHANDROSS, SHENGFENG CHENG, Sandia National Laboratories — Materials that perform well in electrical contacts usually exhibit high adhesion during frictional contacts. An excellent example of this phenomenon is pure gold, which has extremely low electrical contact resistance, but generally has a high friction coefficient. The exception to this, however, is nanocrystalline gold alloyed with minute amounts of Ni or Co, which in addition to its low contact resistance can also show low friction. The mechanism for this remains poorly understood. We carried out large scale molecular dynamics (MD) simulations to study the tribological response of both single crystal and nanocrystalline gold or silver films in contact with curved probe tips or flat slabs under a variety of sliding conditions. Results show that grain reorientation and coalescence across the contact interface under compressive load or during shearing are responsible for the observed high friction in these contacts. In metallic alloys of silver, the addition of other elements such as copper introduces lattice mismatch and hinders the grain coalescence, which reduces friction during sliding.

Michael Chandross  
Sandia National Laboratories

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