Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Origin for Static Friction at Atomic Level Studied with Molecular Dynamics Simulations QING ZHANG, Materials and Process Simulation Center, California Institute of Technology, YUE QI, LOUIS HECTOR, GM Research & Development Center, TAHIR CAGIN, WILLIAM GODDARD, Materials and Process Simulation Center, California Institute of Technology, MATERIALS AND PROCESS SIMULATION CENTER, CALIFORNIA INSTITUTE OF TECHNOLOGY TEAM, GM RESEARCH & DEVELOPMENT CENTER COLLABORATION —
Static friction has been always an interesting topic because of its ubiquitous presence in the sliding. With Molecular Dynamics simulations, we studied the static friction behavior for commensurate and incommensurate Al_2O_3/Al_2O_3 interfaces, and flat and rough Al/Al interfaces. It is found that incommensurate Al_2O_3/Al_2O_3 interface has lower static friction than commensurate Al_2O_3/Al_2O_3 interface and roughness on the surface increases the static friction drastically. The relation between interfacial adhesion and friction has been investigated. Simulation results reveal that the origin of static friction is to overcome the potential barriers at the interface along the sliding distance. Static friction is determined by the amplitude of potential barrier of interfacial interaction rather than the absolute value of interfacial adhesion. The relation of static friction and kinetic friction are also discussed.

Qing Zhang
Materials and Process Simulation Center, California Institute of Technology

Date submitted: 07 Dec 2004 Electronic form version 1.4