
MM 36: HV Bennewitz

Time: Thursday 9:30–10:00

Location: IFW A

Invited Talk

MM 36.1 Thu 9:30 IFW A

Onset of plasticity as observed by force microscopy —

•ROLAND BENNEWITZ — INM Leibniz Institute for New Materials, Saarbrücken, Germany

Indentation experiments on many crystalline materials exhibit pop-in events, which have been described as brutal transition from elastic to elasto-plastic response of the surface. The brutality of the event lies in the sudden nucleation and multiplication of a multitude of dislocations. Using very sharp tips of an Atomic Force Microscope to indent atomi-

cally flat and clean surfaces of single crystals in ultra-high vacuum, we have been able to detect pop-in events which correspond to a single glide event over one atomic distance. The emerging dislocation lines terminating the glide plane can be observed on the surface around the indentation by high-resolution non-contact force microscopy. We will discuss the observed dislocation structures and the relation between critical load and theoretical shear stress. Some unexpected observations include sudden dislocation motion as late as 50 minutes after indenting the surface.