

UNH Materials Science Seminar

11:10-12:00, Thursday, March 10, 2005

DeMeritt Hall 209B

University of New Hampshire

Highly Stable Variable Temperature STM for Atomically and Time Resolved Imaging: The Dynamics of Self-Assembly at Surfaces

Bogdan Diaconescu

Department of Physics

University of New Hampshire

Self-ordering growth of nanoarrays on strained interfaces is an attractive option for preparing highly ordered nano-templates of specific feature size densities. High-tech methods used for reducing of the feature sizes may thus be supplanted by this simple and elegant patterning technique. Reconstructed surfaces, e.g. Au(111) or Pt(111), and monolayer thick strained films, e.g. Ag or Cu on Ru(0001), exhibit well-ordered networks of misfit dislocations. These networks can serve as templates for the growth of mesoscopic-scale structures of large-scale order and size uniformity. The combination of interfacial stress and corrosion, like sulfur on monolayer thick Ag on Ru(0001), creates self-ordering arrays of unprecedented regularity. The great potential of this natural templating approach is that the feature sizes and densities are predicted to depend on the interfacial stress in these strained layers. We have the unique capability of being able to measure the resulting driving forces of self-assembly directly through atomically- and time-resolved scanning tunneling microscopy. For this

purpose we designed and build a highly stable Ultra High Vacuum – Variable Temperature – Scanning Tunneling Microscope. It allows us to study the dynamics of self-assembly at strained metallic interfaces at the atomic scale in the temperature range 90-400K. An overview of the instrumental setup and its performance will be given by studies of self-organization of nanostructures on Au(111) and S on Ag films on Ru(0001) at different thicknesses.

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