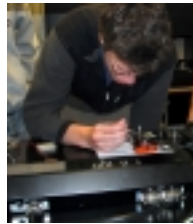
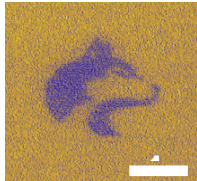
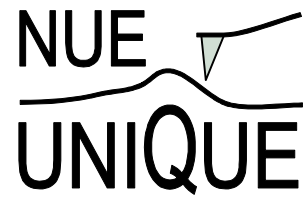




UNIQUE Opportunity
 NSF Sponsored SPM WORKSHOP
 UW, Seattle, WA
 July 6 – 10, 2009



NANOTECHNOLOGY
 UNDERGRADUATE
 EDUCATION:

*USING NANOSCIENCE
 INSTRUMENTATION
 FOR QUALITY
 UNDERGRADUATE
 EDUCATION*

Nanoscience on the tip

a workshop in scanning probe microscopy

The objective of this intensive SPM workshop is to provide a truly hands-on experience (3-4 students per instruments) in a classroom laboratory setting involving a variety of SPM techniques applied to nanoscience and nanotechnology aspects related to chemistry, physics and biology.

Application is now Open at

http://depts.washington.edu/nanolab/NUE_UNIQUE/NUE_UNIQUE_Workshop.htm

Due Date: April 30, 2009

Everyday a new Lab Experience from Nanocomposites to Proteins

This is a one-week intensive hands-on workshop. The number of participants is limited. Offered to enrolled undergraduate students after the first year in a 4 year higher educational institution or senior students in a 2 year higher educational institution (e.g., Community College). This year we also accept a small number of junior graduate students.

This workshop is free. Our Sponsors are:





Nanoscience on the Tip

NUE UNIQUE SPM WORKSHOP
UW, Seattle, WA
July 6–10, 2009



Synopsis and List of Laboratory Units

Students will gain hands-on experience involving a wide variety of nanotechnology/nanoscience applications, using some of the most versatile nano-tools based on Scanning Probe Microscopy (SPM). With an intensive one-week schedule and a low student to instrument and student to TA ratio of 4:1, deep and lasting learning will occur. The intense 40 hours one-week workshop will provide students with the opportunity to apply their theoretical knowledge from prior lecture courses.

Laboratory Units (developed for 2007/8 Labs – Subject to changes for 2009 and downloadable at

http://depts.washington.edu/nanolab/NUE_UNIQUE/NUE_UNIQUE_LAB_INDEX_PREFACE.htm

Lab Unit I: Scanning Force Microscopy and Dip-Pen Nanolithography

The student will become familiar with contact mode Scanning Force Microscopy (SFM) as an imaging technique, and be introduced with Dip-Pen Nanolithography (DPN).

Lab Unit II: AC-Mode imaging and Electrostatic Force Microscopy

This lab unit introduces Electrostatic Force Microscopy to characterize the electrical properties of a blended conjugated polymer film by studying the changes in tip oscillation due to electrostatic force gradients between the tip and the sample.

Lab Unit III: Force Spectroscopy Analysis

This lab unit introduces a scanning force microscopy (SFM) based force displacement (FD) technique, *FD analysis*, to study local adhesion, elastic properties, and force interactions between materials.

Lab Unit IV: Force Modulation Microscopy

This lab unit introduces a scanning force microscopy (SFM) based mechanical (sinusoidal) perturbation method referred to as force modulation microscopy, to explore thermo-mechanical properties in polymers around the glass transition.

Lab Unit V: Scanning Tunneling Microscopy

This lab unit introduces scanning tunneling microscopy (STM) technique, used to obtain real space atomic resolution images of conductive surfaces. The tunneling spectroscopy mode of STM is employed to examine local density of state (LDOS) of the surface.

List of Lab Units currently under development for the Workshop in 2008:

Lab Unit VI: Liquid Cell SFM and In-Situ Study of Protein Adsorption

The student will become familiar with liquid Scanning Force Microscopy (SFM), and learn about fundamental aspects of protein adsorption, i.e., fibrinogen, a protein marker for the immune system. In particular, this lab unit introduces the student to fundamental aspects of adsorption kinetics with hands-on experience.

Lab Unit VII: SFM and SEM: Nanocomposites

In this unit, students will be introduced to nanocomposites and the challenges involved in establishing material phase contrast with AFM. AFM and electron microscopy will be employed to analyze materials. Educational outcomes: Familiarize students with nanocomposite materials and their potential in generating unique properties, such as reversed selectivity in membranes.

Eligibility Requirement

To be eligible for the program students are:

1. Enrolled (at least in the second year) in an undergraduate program at a two or four year higher educational institution, or are at the beginning of their graduate program
2. Majoring in engineering, materials science, chemistry, or physics, and
3. Available **to participate throughout the entire** SPM Workshop in July (5 full days).