

***Training School on Scanning Tunneling
Microscopy (STM), Atomic Force Microscopy
(AFM), and Scanning Near-field Optical
Microscopy (SNOM)***

Roma, 24-26 settembre 2014

*Aula Convegni
Area della Ricerca CNR Roma 2
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Programma

24/09/2014 - Section microscopy STM

8:30-12:30

Welcome – Director ISM, Lorenzo Avaldi

Historical introduction of the Scanning Tunneling Microscopy (STM)

Theory of scanning tunneling microscopy and principle of operation of the microscope

- Tunnel effect
- Bardeen perturbative approach
- Model of Tersoff -Hamann
- STS spectroscopy
- Principle of operation of the instrument

Description of the instrumentation and method of operation

- Description of the instrument
 - i) Tip
 - ii) Scanning System
 - iii) methods for vibration isolation
- Method of measurement
 - i) imaging : height and constant current
 - ii) spectroscopy measurements
 - iii) measures of local dynamic
- Meas : air, liquid , ultra high vacuum

Simulation of STM images from first principles

- Electronic structure of surfaces using density functional theory
- Simulated STM Images : approach of Tersoff -Hamann
- Simulation of STS spectra
- More advanced approaches for electronic structure calculations and STM images

14:30 to 18:30

- 1) Description of the experimental apparatus
- 2) Description of tips preparation
- 3) Preparation of a clean surface of a semiconductor
- 4) Capture images and STS
- 5) Post-processing data

25/9/2014 - Section microscopy AFM

8:30-12:30

Atomic force microscopy: principles, instrumentations, and Applications

The curves of force in the study of biological samples

The AFM microscopy in materials science

14:30 to 18:30

- 1) Description of experimental apparatus
- 2) Description of tips preparation
- 3) Preparation of sample
- 4) Capture images and force curves
- 5) Post-processing data

26/9/2014 - Section microscopy SNOM

Historical introduction of near-field optical microscopy (SNOM)

- Description of the instrument
 - i) Tip
 - ii) Scanning System
 - iii) methods for vibration isolation

SNOM: theoretical principles and operating configurations

TERS

The SNOM fluorescence microscopy, reflectivity and photoconductivity

The SNOM microscopy coupled to a source of infrared light

14:30 to 18:30

- 1) Description of experimental apparatus
- 2) Description of optical fiber tips preparation
- 3) Detection of the optical signal
- 4) Capture images
- 5) Post-processing data