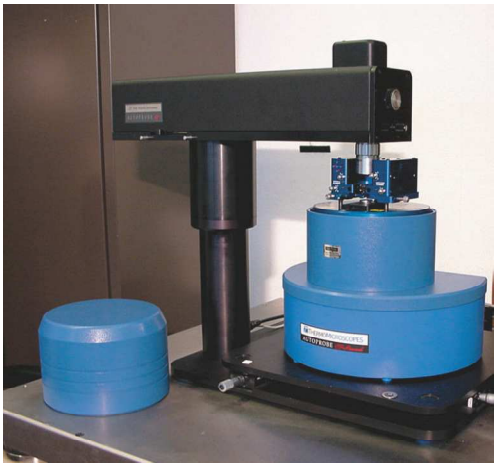
ATOMIC FORCE MICROSCOPY (AFM) FACILITY



MODEL: Veeco CP-II

INSTALLATION PLACE: Surface characterization Laboratory (room No18 new building), Department of Microelectroncis

DESCRIPTION: The Veeco CP-II Scanning Probe Microscope (SPM) enables the study of the surface properties of a wide range of materials with atomic scale resolution. It allows imaging with many SPM techniques, including Atomic Force Microscopy (AFM) and Scanning Tunneling Microscopy (STM).

SPECIFICATIONS

1. Two scanners
   a. $5\times5\mu m^2$ open-loop scanner with ≥1.5μm Z range
   b. $100\times100\mu m^2$ closed-loop scanner with ≥7.5μm Z range; X-Y resolution:0.1nm : Z resolution: 0.007nm
2. XY Translation Stage: 6×6mm manual translation with 2μm resolution
3. Max sample size: 50×50×22mm
4. Optics: ×20 objective lens, manual zoom and color CCD camera for accurate tip positioning
5. Electronics: 20-bit DACs for piezo control in X, Y and Z
6. FEMTO DLPCA-200 Variable Gain Low Noise Current Amplifier, Trans-impedance Gain from 10^3 to 10^{11} V/A, Rise Time down to 700ns, Input Noise down to 4.3 fA/√Hz.
7. Stanford Research Systems SR830 lock-in amplifier
8. Vibration isolation table
9. Data Acquisition Software: ProScan
10. Image Analysis Software: SPMLab Analysis
11. Imaging Techniques:
    - Contact Mode
    - Non-contact Mode
    - Tapping Mode
    - Phase Imaging
    - Lateral Force Microscopy (LFM)
    - Conductive AFM (CAFM)
    - Scanning Capacitance Microscopy (SCM)
    - Electrostatic Force Microscopy (EFM)
    - Tunneling AFM (TUNA)
    - Scanning Spreading Resistance Microscopy (SSRM)
12. Spectroscopic Measurements:
    - Force vs Distance
    - Amplitude vs Distance
    - Automatic measurement of 16 curves equally spaced on a user-defined line
    - Automatic Averaging
    - Current vs Voltage

APPLICATIONS

1. Structural, electrical characterization and profiling of the surfaces for semiconductors, insulators, polymers, metals and structures (nanowires, nanoparticles)
2. Qualitative and quantitative analysis of surface modification (e.g. surfactants, roughness)

CERTIFICATION/ACCREDITATION

The facility is not certified or accredited.

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