Basic methods in imaging of micro and nanostructures with AFM (Atomic Force Microscopy)

Item No. P2538000

Principle

Approaching a sharp silicon tip mounted on a cantilever to a sample surface leads to an atomic scale interaction. The result is a bend of the cantilever which is detected by a laser. In static mode the resulting deflection is used to investigate the topography of the sample surface line by line using a feedback loop. In dynamic mode the cantilever is oscillated at fixed frequency resulting in a damped amplitude near the surface. The measurement parameters (setpoint, feedback gain) play a crucial role for image quality. Their effect on the imaging quality is investigated for different nano structured samples.

Benefits

- Investigation in static and dynamic mode
- Modification of numerous parameters to optimize image quality
- Perform experiment with different samples
- Excellent price-performance ratio
- Custom-designed for use in teaching labs
- Microscope consists of one compact, portable instrument, no additional instruments required
- Vibration isolated for better and reproducible results

Tasks

1. Learn how to mount a cantilever (with tip) and approach the tip towards a sample.
2. Investigate the influence of the scanning parameters on the imaging quality and performance, e.g. PID gain, setpoint (force), vibrational amplitude, and scanning speed. Use both static and dynamic force mode.
3. Image different samples (microstructures, carbon nano tubes, skin cross-section, bacteria, CD stamper, chip structure, glass beads) by optimizing the parameters respectively.

Learning objectives

- Atomic Force Microscopy (AFM)
- Lennard-Jones potential
- Imaging of nano structures
- Static Force Mode
- Dynamic Force Mode
- Feedback loop
- Force
- Vibrational amplitude

Software included. Computer not provided.

Scope of supply

Compact AFM, Atomic Force Microscope	09700-99	1