**Atomic force microscope Integra**

**Equipment:** Atomic force microscope Integra (NT-MDT)

**No. of Equipment: UJEP24**

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**Equipment Description**

**Description of equipment:**

*Atomic force microscope Integra (NT-MDT)*

Specifications and technical features:

Atomic force microscopy system is useful for analysis of morphology and structure of nanomaterials in air and liquid environment with atomic resolution. It can be used in wide range of applications including the characterization of proteins, DNA, viruses, bacterial cells, tissues, surface morphology of nanostructured materials, local piezoelectric properties, local adhesion properties, magnetic domain structure visualization, polymer monocrystals, polymer nanoparticles, LB-films, thin organic films, nanopowders, nanocomposites, nanoporous materials, fullerenes, nanotubes, nanofilaments, nanocapsules and performing AFM and STM lithography.

Measuring modes and techniques:

In air and liquid: AFM (contact + semi-contact + non-contact) / Lateral Force Microscopy / Phase Imaging/ Force Modulation/ Adhesion Force Imaging/ Lithography: AFM (Force)

In air only: STM/ Magnetic Force Microscopy/ Electrostatic Force Microscopy/ Scanning Capacitance Microscopy/ Lithography: AFM (Current), STM/ AFAM (optional)

Technical data:

*Scanning by sample*

Sample size: up to 40 mm in diameter, to 15 mm in height

Sample weight: up to 100 g

XY sample positiniong: 5x5 mm

Positioning resolution: readable resolution - 5 µm, sensitivity - 2 µm

Scan range: 100x100x10 µm, 3x3x2,6 µm

Non linearity, XY: (with closed loop sensors) - 0.1%

Noise level, Z: (RMS in bandwidth 1000 Hz), with sensors: 0.04 nm (typically), 0.06 nm, without sensors : 0.03 nm

Noise level, XY: (RMS in bandwidth 200 Hz), with sensors: 0.2 nm (typically), 0.3 nm (XY 100 µm) without sensors 0.02 nm (XY 100 µm), 0.001 nm (XY 3 µm)

Linear dimension estimation error (with sensors): ± 0.5%

Optical viewing system: Optical resolution - 1 µm

Field of view 4.5-0.4 mm

*Scanning by probe*

Sample size: up to 100 mm in diameter, up to 15 mm in height

Sample weight: up to 300 g

Scan range: Less than 1x1x1 µm, 100x100x10 µm, 50x50x5 µm

Non linearity, XY: (with closed loop sensors) - 0.15%

Noise level, Z: (RMS in bandwidth 1000 Hz), with sensors 0.06 nm (typically), 0.07 nm, without sensors 0.03 nm, 0.05 nm

Noise level, XY: (RMS in bandwidth 200 Hz), with sensors - 0.1 nm (typically), 0.2 nm (XY 50 µm), without sensors 0.01 nm (XY 50 µm)

Linear dimension estimation error (with sensors) ± 1.2%

Optical viewing system: Optical resolution - 3 µm

Field of view 2.0-0.4 mm

Vibration isolation: Active 0.7-1000 Hz, Passive above 1 kHz

**Specification of expertise relevant to NanoEnviCz workpackages:**

**WP3**c,d,f,h, **WP4**a, **WP5**c, **WP6**a,d,f **WP7**a,b,h **WP8**f

**Detailed description of expertise**

**Please, specify the main research topics connected with equipment**:

**Analysis of morphology and properties of nanomaterials**

Characterization of proteins, DNA, viruses, bacterial cells, tissues, surface morphology of nanostructured materials, magnetic domain structure visualization, polymer monocrystals, polymer nanoparticles, LB-films, thin organic films, nanopowders, nanocomposites, nanoporous materials, fullerenes, nanotubes, nanofilaments

**Please, specify the secondary research topics connected with equipment**:

**Keywords describing research area:**

Analysis, nanomaterials, nanostructured surfaces, biomacromolecules

**Competence**

**Relevance for applied and industrial research:**

Studying the quality and surface properties of materials for industrial applications

**Relevance for fundamental studies:**

Structure and properties of wide range of nanomaterials in air and liquid environment