Next-Level Nanotechnology Tools swiss quality

ANA

The best solution for automated force mapping

nanosurf

Automated nanomechanical data acquisition and analysis

ANA - Automated Nanomechnical Analysis - is designed to investigate the nanomechanical properties of materials such as cells, tissues, scaffolds, hydrogels, and polymers on multiple or large samples in an easy-to-use fashion. Currently the ANA solution is available with Flex-Bio, Flex-Axiom and Flex-Mount systems.

Key software features

Straightforward experimental workflow: only a few steps from sample mounting to results

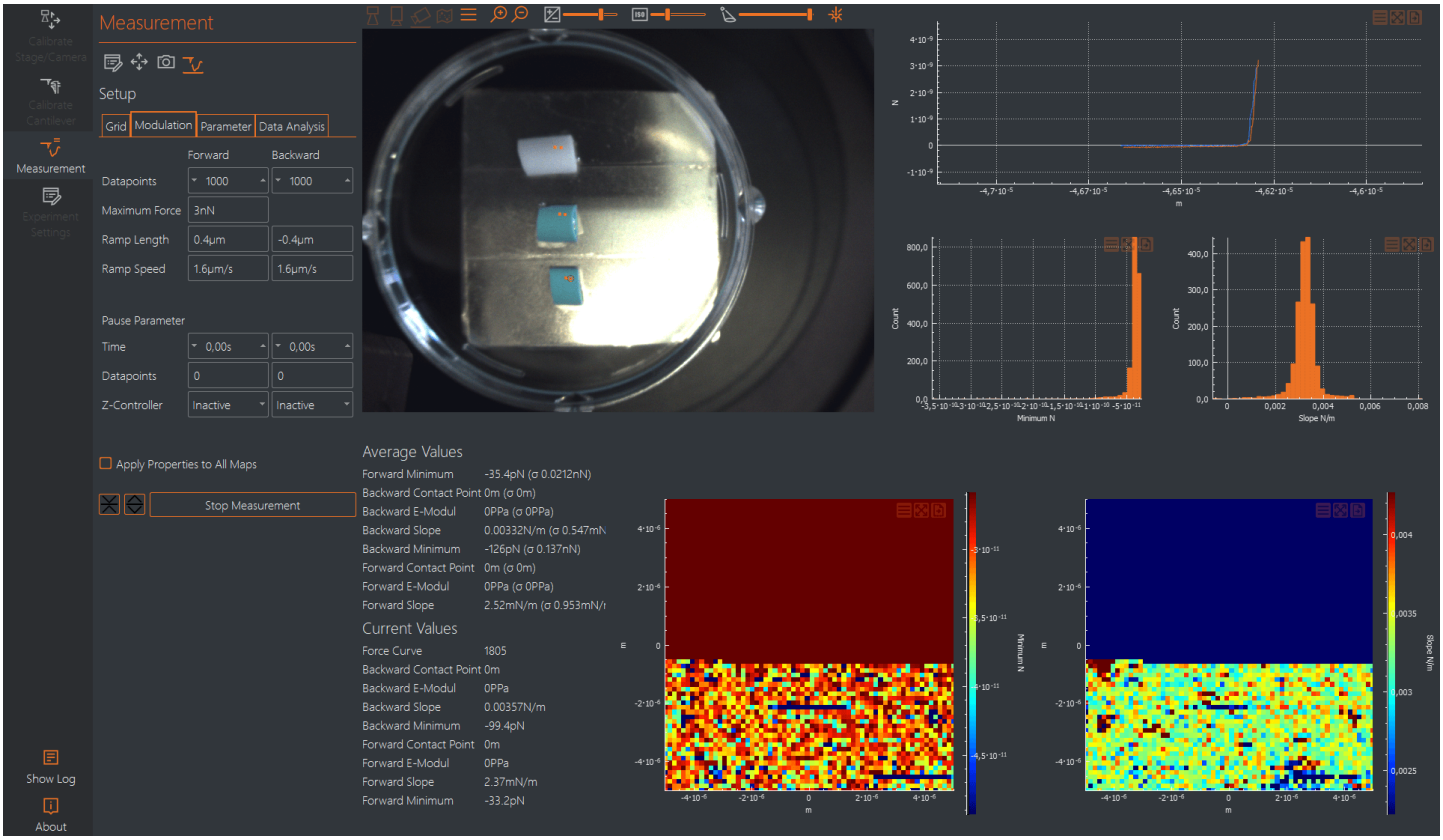
One-click cantilever calibration: automatic cantilever deflection sensitivity and spring constant (Sader method) measurement

Real-time data analysis: Young's modulus, adhesion, and indentation are calculated and displayed during the measurement

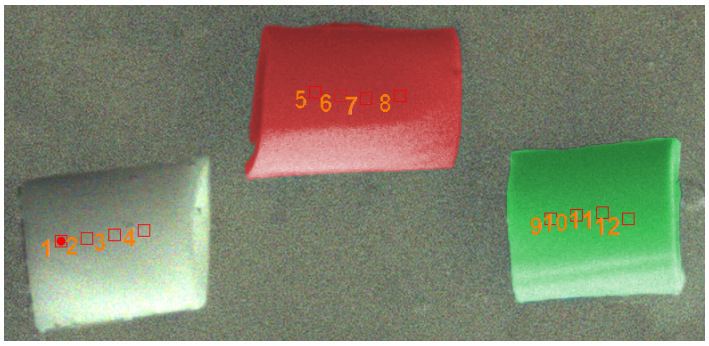
Facilitates measurements on demanding samples: experimental workflow repositions the sample for every measurement area

Key hardware features

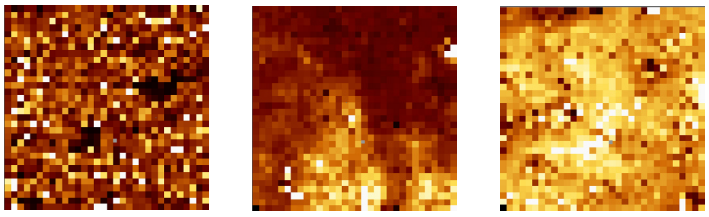
Flex-Axiom	Flex-Bio
Large field-of-view overview image to define measurement locations within 32x32 mm^2	Define measurement locations within the field of view of your inverted optical microscope
Precisely address areas of interest on large or multiple samples using motorized xy motion	Precisely address areas outside the xy scan range of the AFM using the 12 mm x 12 mm motorized sample stage
Cope with more than 4 mm height variation across a sample	Optional 100 µm z actuator to address e.g. high cells
Optional 100 µm z actuator for locally rough or sticky samples	
Reduced viscoelastic effects: nanoindentation measurements are performed at appropriate indentation velocities to allow relaxation of the sample; automation allows collecting large amounts of data without operator presence	
Small indentation depths and forces: nanoindentation can be performed with indentation depths and forces significantly lower than possible with conventional nanoindenters; force resolution below 7 pN (in liquid)	



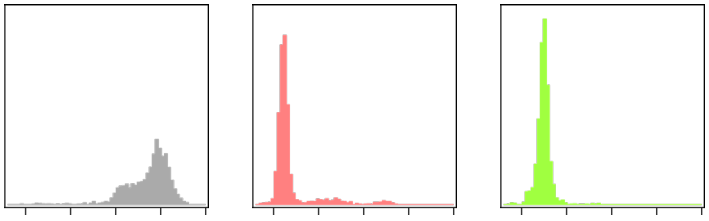
Flex-ANA workflow



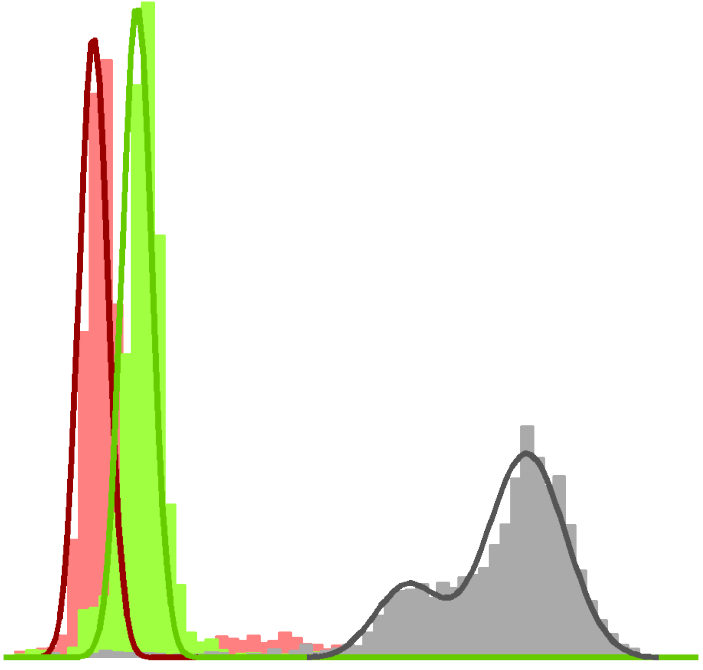
Multiple samples, each with easily defined measurement locations



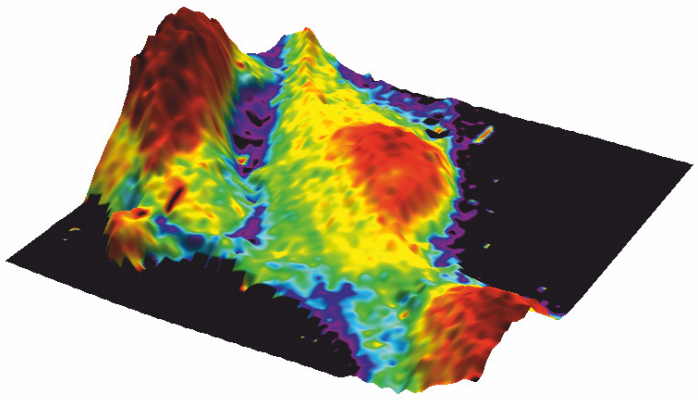
Single modulus maps from all selected locations



Modulus histogram for each sample



Comparison of the different samples



3D representation of the cell topography overlaid with the color scale representing the Young's modulus.
Data courtesy Philipp Oertle, Biozentrum, University of Basel.

Flex-ANA system workflow

Mounting and calibrating the cantilever	Automated measurement and calculation of deflection sensitivity and spring constant Spring constant calibration based on the Sader Method Resonance frequency and Q-factor extraction from thermal noise power spectrum Frequency range 0–5 MHz
Sample loading and overview image	35 mm × 35 mm sample platform Overview image covering up to 80 mm × 60 mm
Definition of measurement locations and conditions	Resonance frequency and Q-factor extraction from thermal noise power spectrum
Start of the automated measurement	Autonomous measurements at defined locations Automatic sample approach at each location with a maximum approach range of 5 mm Real-time data analysis (elastic modulus in the range of 0.1 kPa – 20 GPa (1), adhesion, height, slope of contact region) Map and histogram are available for each analysis parameter
Analysis optimization	Integrated data browser with data preview Various contact mechanics models (Hertz, Sneddon, DMT, 4-Sided Pyramid)
Results	Export of final histograms and maps

(1) Accessible modulus range depends on choice of cantilever

MTS 32 specifications

Range (X / Y / Z)	32 / 32 / 5 mm
Optional δZ range	100 µm
Positioning accuracy (X / Y / Z / δZ)	<1 / <1 / <1 / <0.001 µm
Repositioning accuracy (X / Y / Z)	<2 µm

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