AFM Controller GALAXY DUAL

New opportunities with 5100/ 5500/ Pico SPM/ Multimode, AFM/STM bases

The GALAXY DUAL controller creates new opportunities for AFM users by combining new features with those already available on your existing AFM. This new entrolle offers more than a second life to your AFM, it renews and improves the performance with new imaging modes and new intuitive software.

The GALAXY DUAL USB controller offers a real integrated lock-in for better measurement capabilities (phase detection, field measurement...). Low-noise electronics and power supply coupled to a 24bit drive architecture provides high resolution and smart integration.

5100 AFM

5500 AFM

Multimode

Nano-Observer CSInstruments

» Keep your existing AFM modes

- STM, Contact, AC, Phase, MFM, EFM, PFM, LFM, EC modes

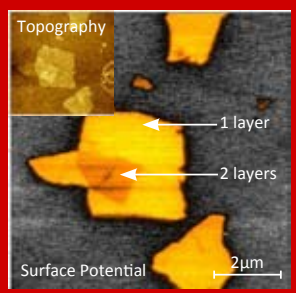## » Add new advanced modes

✓ **HD-KFM**
- No lift KFM
- Much higher sensitivity & resolution
- 2nd lock-in amplifier

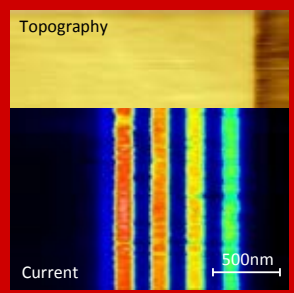✓ **ResiScope & Soft ResiScope**
- Resistance & current
- From 10^2 to 10^{12} ohms
- Also on soft samples

✓ **Soft Intermittent Contact**
- Adhesion, Stiffness, Young's Modulus
- Constant force = quantitative measurement

» Fully compatible

- Contact, Oscillating
- Conductive
- EFM, MFM, PFM
- Force modulation
- Advanced modes
- SthM
- MLFM mode
- Environments...

HD-KFM mode
Graphene - 8µm

ResiScope mode
Dopant profiling on
cleaved Si - 2µm

Soft IC mode
PS-PMMA - 50µm
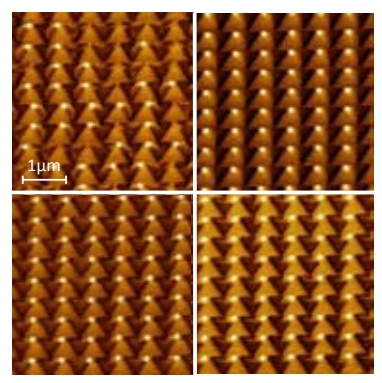
MLFM mode
Structures under different
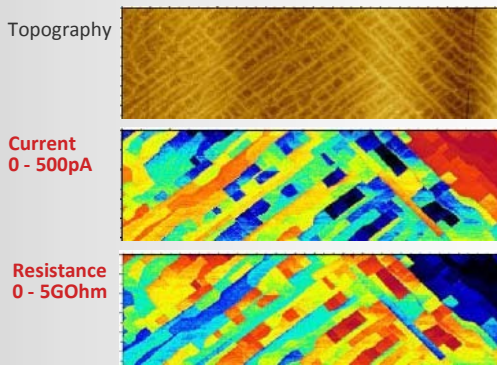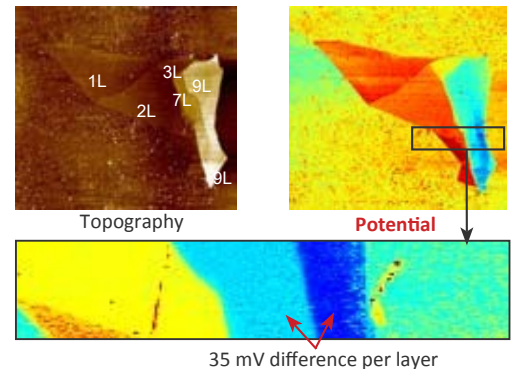magnetic fields, 50 to 470 gauss

» New advanced modes:

✓ HD-KFM (no lift):
Most advanced single-pass KFM mode

CSInstruments has developed an ultra-sensitive implementation of KFM named as High Definition-KFM (HD-KFM), which uses 2 lock-ins matched to the first two eigenmode frequencies of the canti-lever to acquire both topography and surface potential. HD-KFM has the advantage of amplifying the feedback signal through the second eigenmode of the cantilever. Also it allows a much closer probing of the electric field created by the surface potential com-pared to other approaches. This is of extreme relevance when imaging small molecules or bidimensional materials.

**MoS_2 on Au substrate
HD-KFM mode, 85μm**

Topography   **Potential**

35 mV difference per layer

✓ ResiScope & Soft ResiScope (soft samples):
AFM conductivity & resistance

The ResiScope II is a unique system able to measure AFM resistance over 10 decades with a high sensitivity and resolution. It can be combined with several dynamic modes as MFM/EFM or KFM single-pass providing several sample characterization techniques on the same scan area.

The measurement is made by applying a DC bias between the sam-ple and a conductive AFM probe (tip at virtual ground). The ResiScope measurement covers 10 order of magnitude with same module driven by a DSP to control the range (auto range) and the current (sample/tip protection) by choosing the appropriate Gain for the ResiScope pream-plifier at fast rate. This is done in in real time acquisition and a regular scan rate.

Topography

**Current
0 - 500pA**

**Resistance
0 - 5GOhm**

**Vanadium dioxide sample (VO_2)
at 30°C, ResiScope mode, 20x6μm**

✓ Soft Intermittent Contact (Soft IC)
Mechanical properties

Concept Scientific Instruments has developed an alterna-tive measurement mode called Soft Intermittent Contact mode (or Soft IC) that com bines the advantages of contact mode and force spectroscopy but preventing from their inconvenients like friction forces or intrinsic slowness.

PDMS sample, Soft IC mode, 90μm

Topography   **Adhesion**   **Young's Modulus**
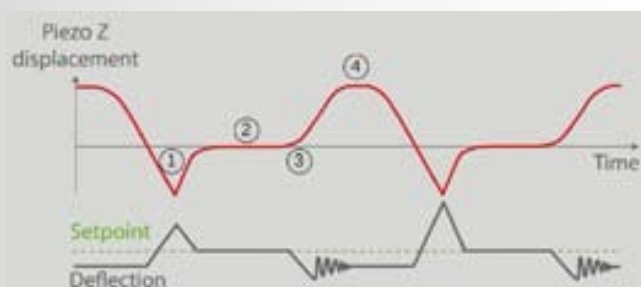
1. Stiffness | 2. Topography & Constant force = quantitative measurements
3. Adhesion | 4. Next point

Compatible with:

Soft ResiScope
VO_2, 4,5μm

Soft SThM
Single crystalline Si steps
under polished CVD SiO ,

Soft PFM
BTO - PVDF, 5μm

NanoSolution Software
High-definition AFM imagery finally accessible to everyone in a few seconds
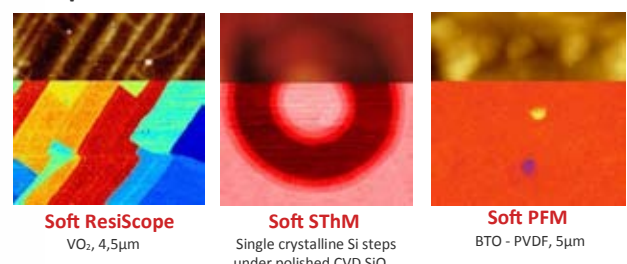
NanoSolution is a powerful AFM software package that allows an inexperienced user to automatically obtain a high quality image with only a few clicks, independently and without difficulty. In parallel, manual mode offers a full set of functions and parameter settings so that an experienced user can perform more complex measurements for publication.

» Easy to use interface

The NanoSolution user interface is very intuitive and versatile;
- AFM mode selection quickly and automatically configures the electronics in just one click requiring no help from the user
- The interface, composed of clickable buttons and a guided workflow allows easy configuration of the AFM for efficient image acquisition
- The top view allows for simple laser alignment and adjustment by displaying a view of the laser reflection on the tip. The side view allows a really easy pre-approach without damage to the tip and sample.
- The auto setting allows the user to obtain an AFM image in just a few clicks while access to the parameters gives an expert the opportunity to exercise all of the AFM's capabilities for a very high quality image.

Workflow
Step by step

Mode Selector
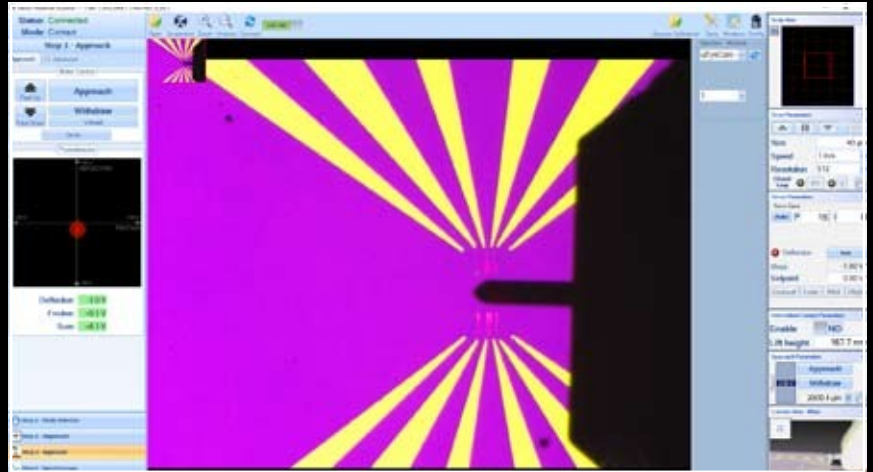
Parameters data windows

» Software designed for everyone: performance and versatility

Whether the user is new or experienced, whether AFM needs are focused on academic research or industry, NanoSolution is a software suitable for everyone.

The ultra fast automated mode allows inexperienced users to produce a quality image very easily and with less support. All the user needs to do is to follow the workflow instructions for configuring the AFM and launch the scan in 1 click.
- Auto tune
- Auto approach
- Auto gain
- Auto predefined setpoint AFM condition

In parallel, the manual mode which requires advanced experimentation and requires increased knowledge in the acquisition of an image, offers high control and gives access to all the functions and adjustments necessary so that the most experienced users can refine their results and generate high quality images usable for their analysis.

Imaging parameters

» Advanced spectroscopy

In addition to the standard spectroscopy parameters, the Nanosolution software has unique functions specially created for force curve spectroscopy.

- The FLEX GRID allows the user to select several points to measure during the scan and obtain the force curves at the coordinates selected. An interactive file will then allow him to position the curves on topography image (or other signal).
- The FIXED STEP GRID allows the user to obtain a force curve map configured in number of points per line.
- The EXPERT CURVE CONTROL is segment programming of the displacement of the probe in Z with different parameters: speed, resolution or even duration.

These unique functions make NanoSolution a powerful software for force curves.

FLEX GRID   FIXED STEP GRID   EXPERT CURVE CONTROL

» Controller specifications

XY drive resolution	24 bit control - 0.06 A
Z drive resolution	24 bit control – 0.006 A
Ultra low noise HV	Typ : <0.01 mV RMS
6 DAC Outputs	6 D/A Converters – 24 bit - (XYZ drive, bias, aux…)
8 ADC Inputs	8 A/D Converters – 16 bit
Data points	Up to 8192
Integrated Lock-in	Up to 6MHz (software limited) - 2nd 6MHz lock-in (optional)
Interface	USB 2.0
Controller Power	AC 100 – 240 V - 47-63 Hz
Operating System	Compatible Windows 10

CSInstruments

CSInstruments is a French scientific equipment manufacturer specialized in the conception of Atomic Force Microscopes and options designed for existing AFM. The company was founded by a team of experts working in the AFM field for more than 20 years, starting as pioneers for some historic manufacturers. Taking the best of this experience to create the Nano-Observer, a high quality research AFM giving life to an affordable solution for any research laboratory or industry...

CSI Concept Scientific Instruments

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