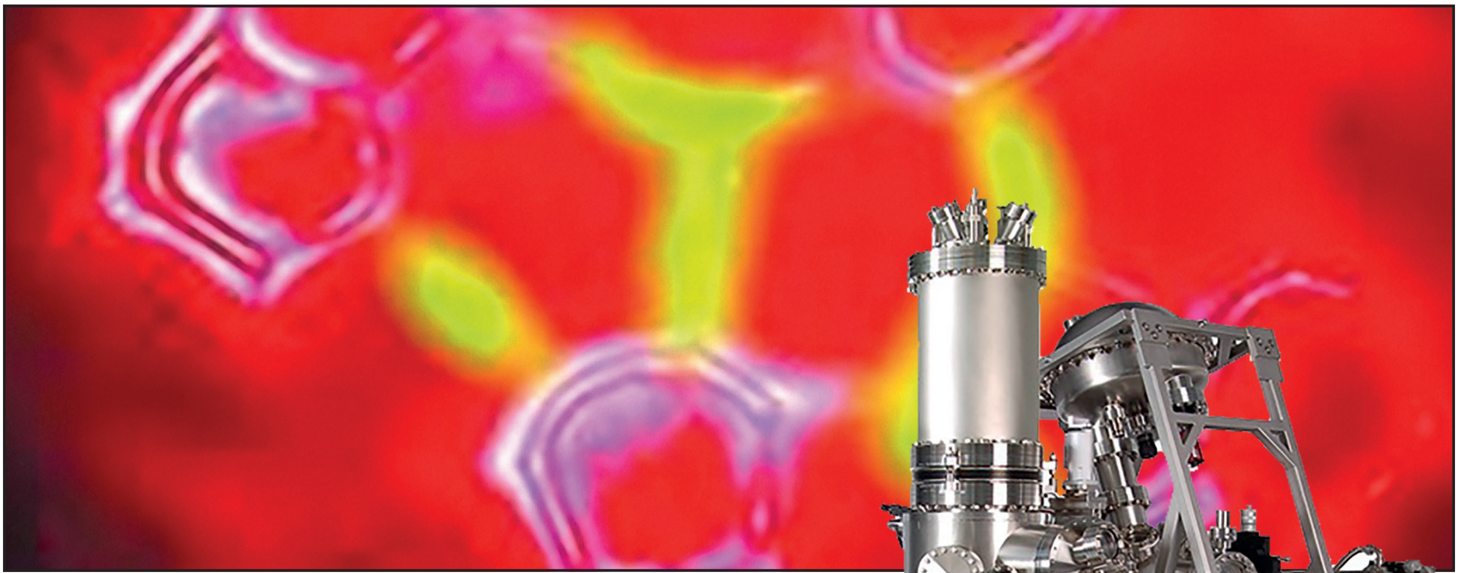
LT STM

Ultimate SPM performance below 5 K



- Increased LHe holding time
- High-frequency wiring for time-resolved SPM
- Increased spectroscopy resolution
- Record proven performance level in STM, STS & QPlus nc-AFM
- Lowest Thermal Drift & Highest Stability
- Reliable design to ensure high up-time
- MULTIPROBE platform combines high-end solutions of SPM, ESPEC and MBE

LT STM - General information

Since its introduction in 1996, our Low Temperature STM has set the standard for stability, performance and productivity for 4LHe bath cryostat STMs. More than 20 years after presenting the LT STM, the importance of low temperature SPM techniques in a wide range of active scientific fields is still unbroken. Spectroscopy on molecules, atom manipulation, carbon, superconductors, semiconductors, gases on metals, and magnetics are only a few examples where research takes great advantage of low temperature SPM. Within all these areas more publications have been produced with our LT STM than with all other commercial low temperature SPM´s combined.

In recent years, the publications have highlighted the industry-leading QPlus AFM performance that the LT STM provides. As we continue to release new STM platforms, Scienta Omicron is also pleased to announce the release of a new, third-generation instrument that further improves the performance and productivity of the LT STM.

A key feature of the third generation is a 30 % increase in liquid helium hold time. This is of great advantage for all low temperature experiments, reducing operating costs and providing users more flexibility. The new cryostat design enables long-term spectroscopy experiments without any compromise to the stability the LT STM has always delivered. Additionally, completely new state of the art wiring and connections have been designed throughout the system. The LT STM III now supports high frequency lines for tip and sample to enable time resolved STM experiments in the GHz range. Further, the ultimate energy resolution for spectroscopy has been improved to < 1 meV, ideal for work with superconducting materials.

When combined with the MATRIX 4 controller and its new, high performance PLL, performing QPlus© AFM experiments in the LT STM will be easier and more powerful than any other QPlus© AFM platform.

The LT STM.

This third generation of the LT STM enables our customers to carry out the most advanced low temperature STM, spectroscopy and QPlus© AFM experiments. And like its previous iterations, the ease-of-use, stability and proven reliability in the LT STM ensure a high productivity, workhorse microscope.

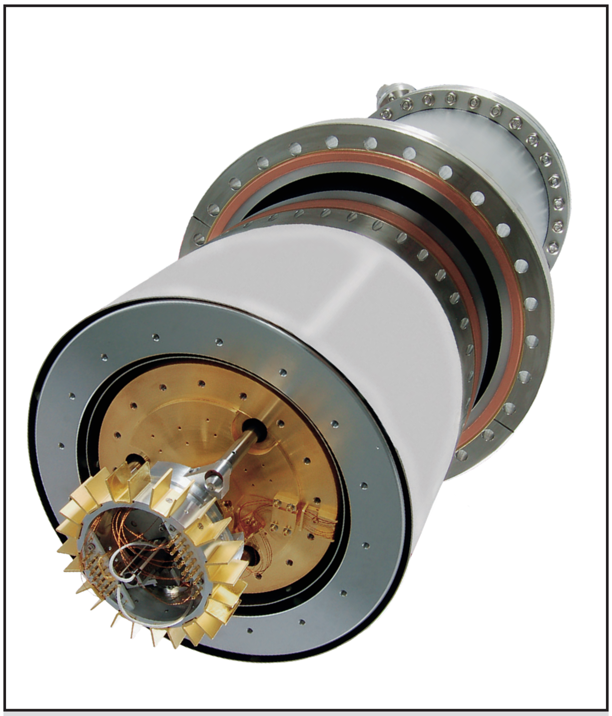
LT STM advantages:

- Increased hold time to >65h at same performance level
- High frequency wiring
- Increased spectroscopy resolution
- Record proven platform since 1996 with more than 200
- instruments installed
- Reliable design ensuring high up-time
- Independent tip and sample temperature
- Leading QPlus© AFM technology

LT STM - Cryostat

The LT STM is typically used for experiments which require the highest level of stability and performance.

To support such experiments we increased the hold time of liquid helium by 30 % without any compromise to the proven stability the LT STM always delivered. By enlarging the volume of the LN_2 vessel, the LN_2 level in the cryostat is always above the level of LHe leading to a reduced helium evaporation rate and an overall hold time of more than 65 h. This is of great advantage for all low temperature experiments and will further improve the performance and productivity of your LT STM with reduced operating costs.



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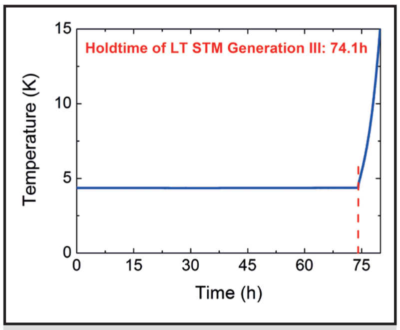
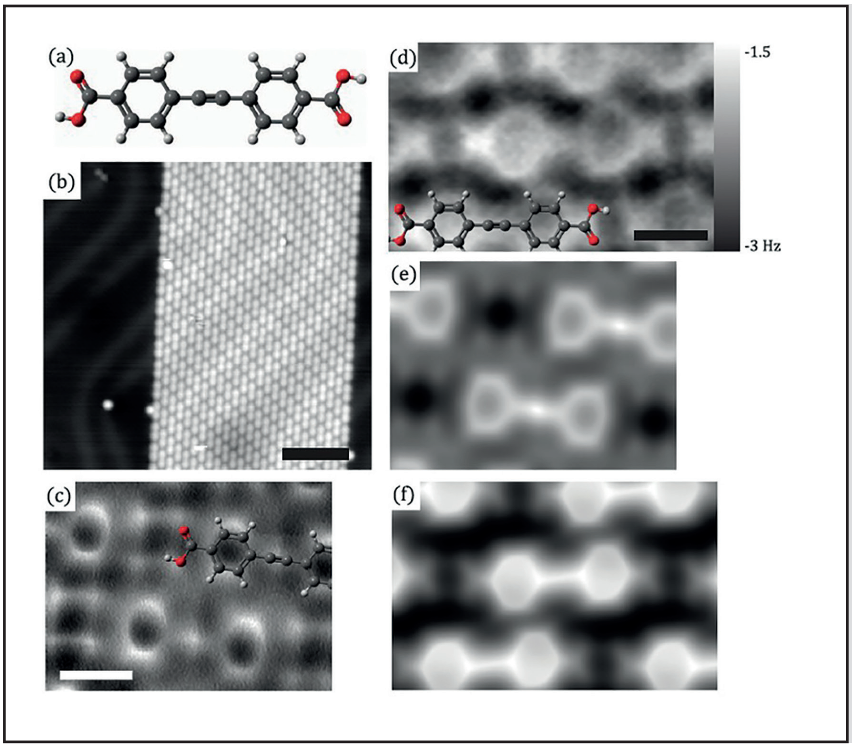


The cryostat of the third generation LT STM provides an extended holdtime of above 65 hours without stability compromises.



BPBA molecules on Au(111) imaged with a CO and Xe tip.

(a) Model of BPBA.

(b) STM image of the self-assembled structure of BPBA on Au(111), 0.1 V, 10 pA, scale bar: 5 nm

(c) Constant height Δf image of BPBA recorded with a CO tip. Image recorded at −1 Å STM set point (0.1 V, 10 pA), scale bar: 5 Å

(d) Constant height Δf image of BPBA recorded with a Xe tip. Image recorded at −2.55 Å STM set point (0.1 V, 10 pA), scale bar: 5 Å.

(e) Simulated Δf image for a CO terminated tip with a Qtip ¼ −0.05e− and kx;y ¼ 0.25 N=m.

(f) Simulated Δf image for a Xe tip with a Qtip ¼ þ0.3e − and kx;y ¼ 0.25 N=m.

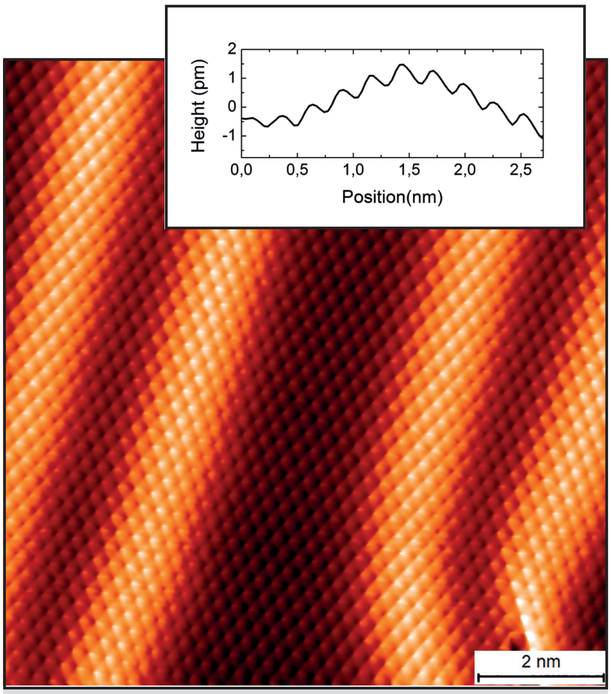
Publication: Ingmar Swart et al., PRL 116, 096102 (2016)

LT STM - Stage Details

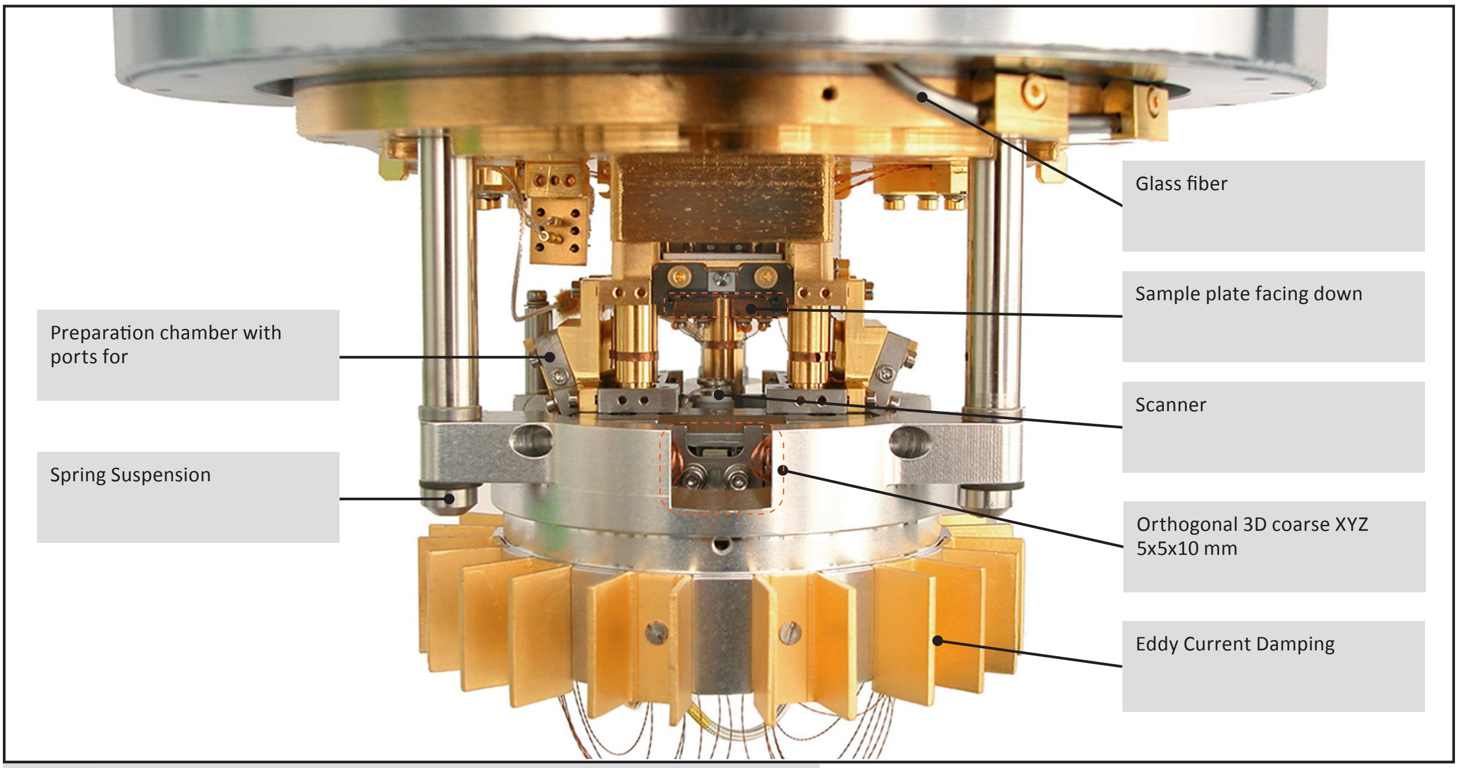
The LT STM stage has been designed for ultimate STM and AFM performance. It employs a very efficient damping system based on the combination of spring suspension and eddy current damping.

This, together with the very rigid scan head design, ensures excellent vibration isolation with a stability in the femtometer range. While maintaining its unique performance level, the LT STM has been continuously improved for additional functionality and flexibility.

Some examples for the experimental customisation possible with the LT STM are: pre-fitted tapped holes at all optical axes and the cryostat bottom, an optional capillary for integration of glass fibers and optional lens holders.

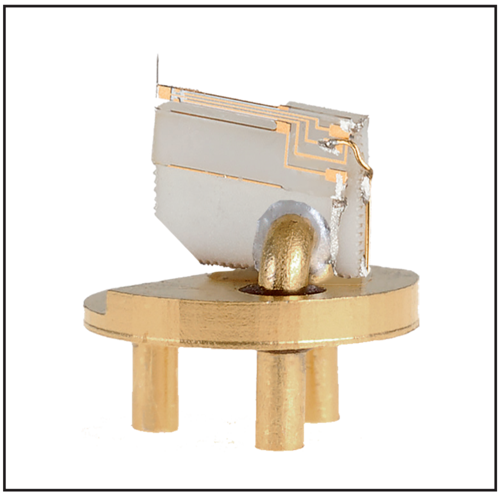


Atomically resolved Au(111) in STM mode, showing nicely the herringbone reconstruction of the gold surface and the corresponding line profile along the black line.

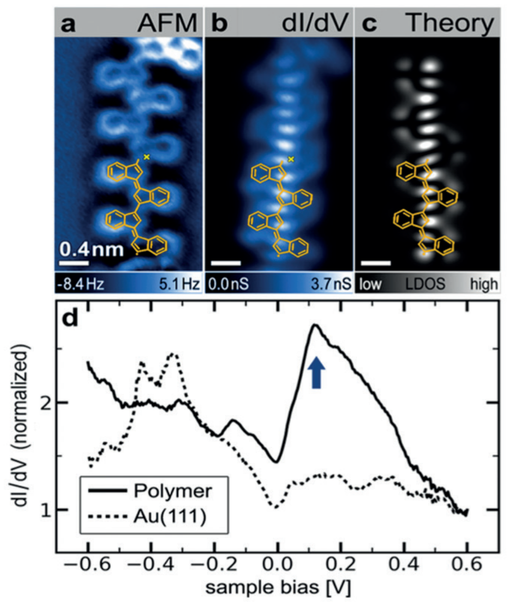


The LT STM stage is equipped with an easy to operate lifting mechanism. The lifted stage is in direct thermal and mechanical contact with the cryostat, guaranteeing fast cool down as well as easy and safe tip and sample exchange. Once cooled, the stage is released into the eddy current damping system for high-performance SPM experiments.

LT STM - Ultimate QPlus© performance



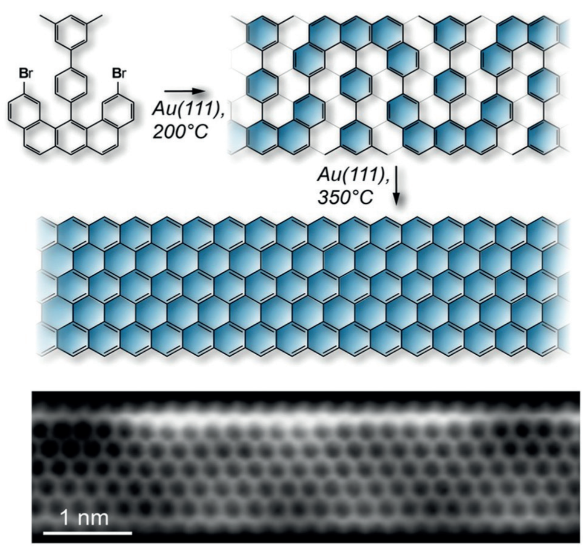
Our leading QPlus AFM technology has been proven in innumerable publications showing highest resolution noncontact atomic force microscopy (nc-AFM) images. Detecting the short range chemical interaction between the foremost tip and sample atoms, enables atomic resolution imaging and quantitative force measurements.



Local Electronic and Chemical Structure of Oligo-acetylene Derivatives Formed Through Radical Cyclizations at a Surface

Semiconducting π-conjugated polymers have attracted significant interest for applications in light-emitting diodes, field-effect transistors, photovoltaics, and nonlinear optoelectronic devices. Central to the success of these functional organic materials is the facile tunability of their electrical, optical, and magnetic properties along with easy processability and the outstanding mechanical properties associated with polymeric structures. In this work we characterize the chemical and electronic structure of individual chains of oligo-(E)-1,1′-bi(indenylidene), a polyacetylene derivative that we have obtained through cooperative C1–C5 thermal enediyne cyclizations on Au(111) surfaces followed by a step-growth polymerization of the (E)-1,1′-bi(indenylidene) diradical intermediates. We have determined the combined structural and electronic properties of this class of oligomers by characterizing the atomically precise chemical structure of individual monomer building blocks and oligomer chains (via noncontact atomic force microscopy (nc-AFM)), as well as by imaging their localized and extended molecular orbitals (via scanning tunneling microscopy and spectroscopy (STM/STS)). Our combined structural and electronic measurements reveal that the energy associated with extended π-conjugated states in these oligomers is significantly lower than the energy of the corresponding localized monomer orbitals, consistent with theoretical predictions.

Publication: Mike Crommie et al., Nano Letters, 14, 2251-2255 (2014)



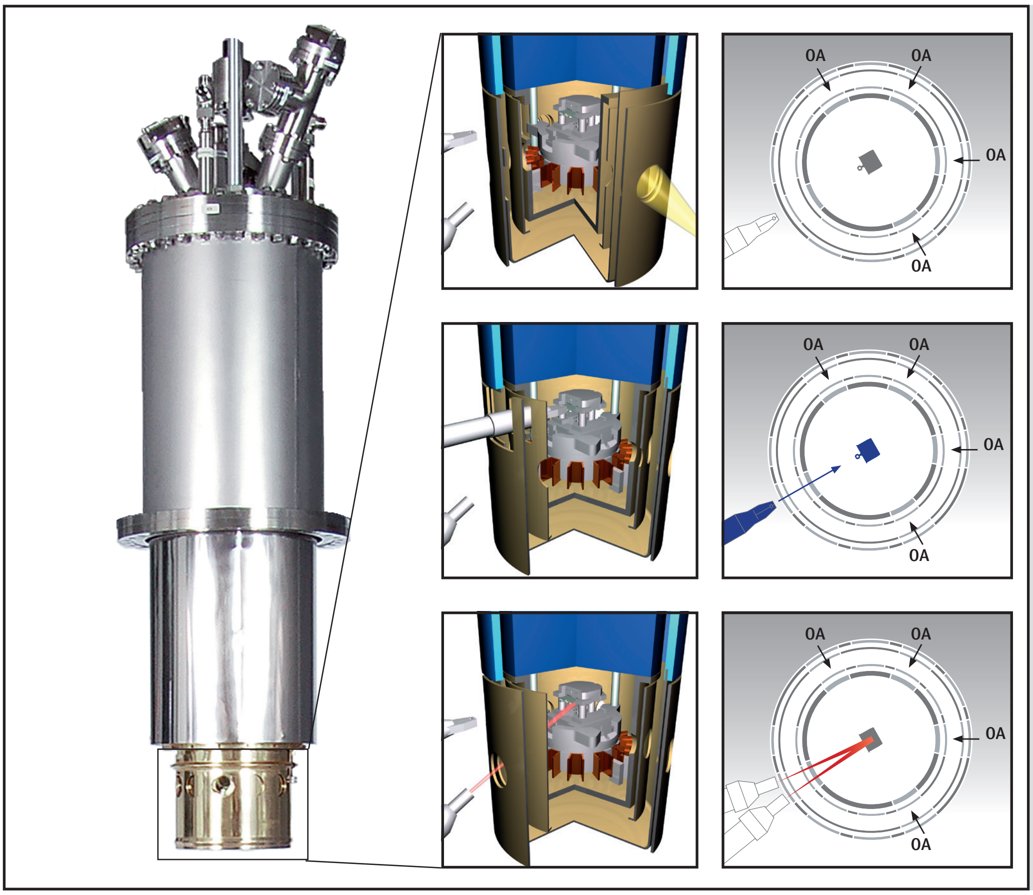
Bottom-up fabrication of atomically precise graphene nanoribbons with zigzag edge topology

Structuring graphene at the nanoscale allows tailoring specific electronic properties in a wide range. For the of armchair graphene nanoribbons (AGNRs), for instance, the atomically precise width definition and edge passivation achieved with a bottom-up fabrication approach allows engineering specific electronic band gaps. Even more intriguing, graphene nanoribbons with zigzag edges (ZGNRs) are predicted to host spin polarized electronic edge states that would make them suitable for spintronics applications.

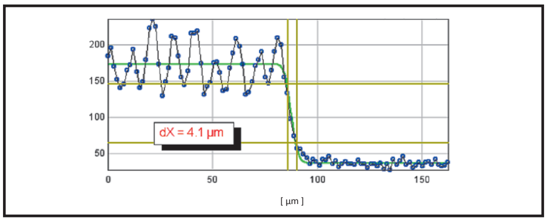
Within a collaboration between synthetic chemists and surface scientists, the synthesis of atomically precise ZGNR has now been demonstrated using a bottom-up strategy based on the surface-assisted colligation and dehydrogenation of specifically designed precursor monomers. Based on non-contact atomic force microscopy (nc-AFM) imaging with CO-functionalized tips, the local bond configurations of the final GNR structure can be directly resolved, which confirms that the observed width and edge morphology corresponds to the expected 6-ZGNR structure as defined by the design of the precursor monomer.
Left: Structure of precursor monomer and surface-assisted reaction step for the synthesis of 6-ZGNRs (top). Constant height nc-AFM frequency shift image taken with a CO-functionalized tip. The intraribbon resolution shows the formation of a 6-ZGNR with atomically precise CH edges. Oscillation amplitude Aosc = 0.7 Å, V = 5 mV.

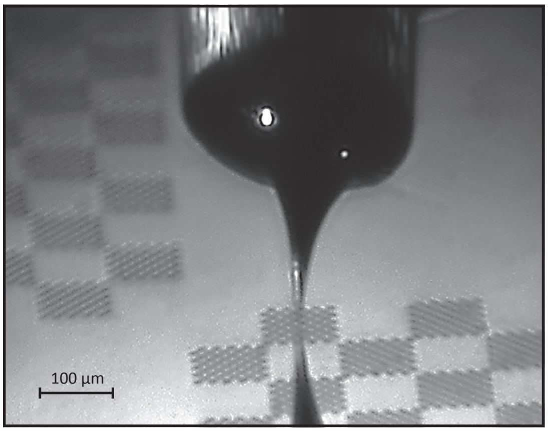
Publication: Pascal Ruffieux et al., Nature 531, 489-492, 2016

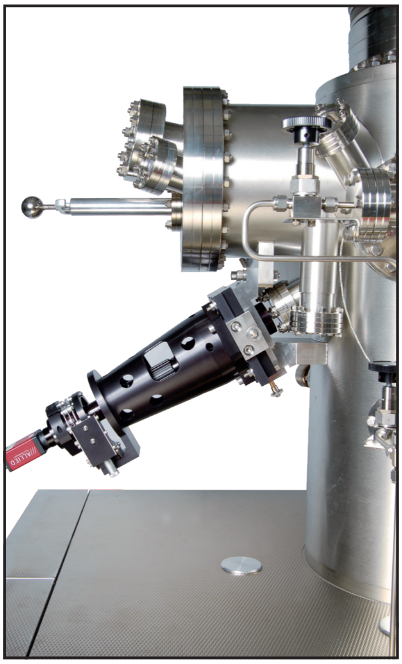
LT STM - Optical Access and in-situ Evaporation



The LT STM has the capability for simultaneous evaporation by two evaporators during STM operation. With the sample facing down, deposition of materials from below becomes possible. In addition, the large Z-coarse range of 10 mm for tip positioning allows for removal of the tip from the evaporation zone. The easy to operate thermal shield compartment consists of two shield pairs for LHe and LN_2 shielding, respectively. To minimize heat impact, the shield concept provides three wobble stick selectable configurations: (i) SPM operation with Tmin < 5 K; (ii) evaporation port open and sample/sensor exchange port closed; and (iii) sample/sensor exchange port open and evaporation port closed. The four optical ports (OA) remain permanently open, while exchangeable IR-blocked quartz windows prevent heat impact.







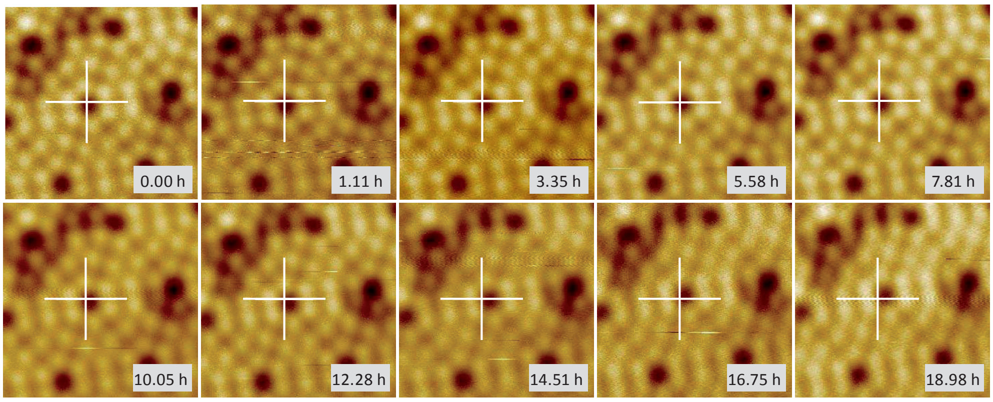
High resolution optical microscopy

The LT STM can optionally be equipped with a long focal length optical microscope for sensor navigation. A dedicated set-up with a high-resolution CCD camera provides optical resolution below 10 µm. The combination of the LT STM´s large scan range and 5x5 mm orthogonal X/Y coarse positioning allows for locating and re-locating nanostructures by employing suitable navigation marks on the surface.

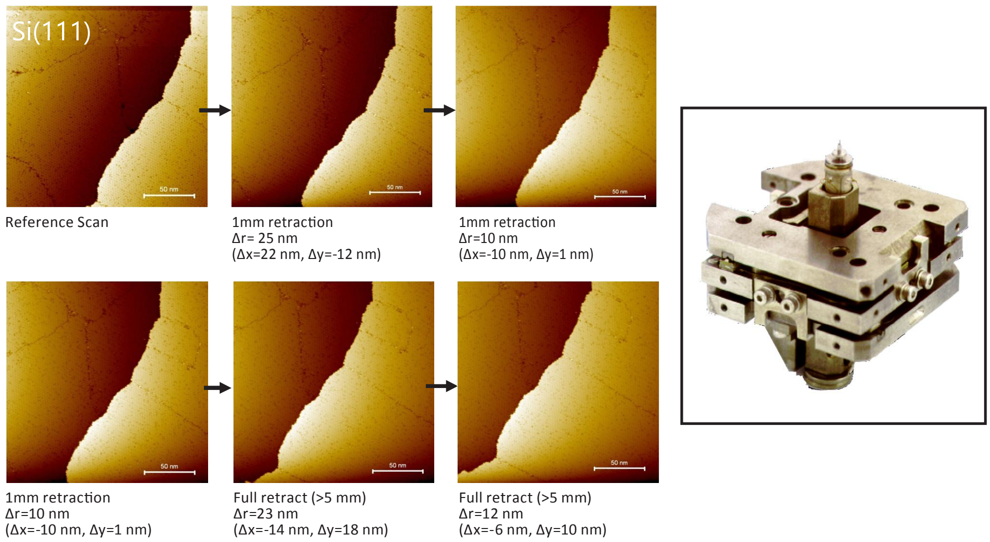
LT STM - Drift and Repositioning Accuracy

One of the advantages of experiments at low temperatures is the long measurement time on the same molecule or atom. The Scienta Omicron LT STM is known for the lowest thermal drift of <0.25 Å/h.

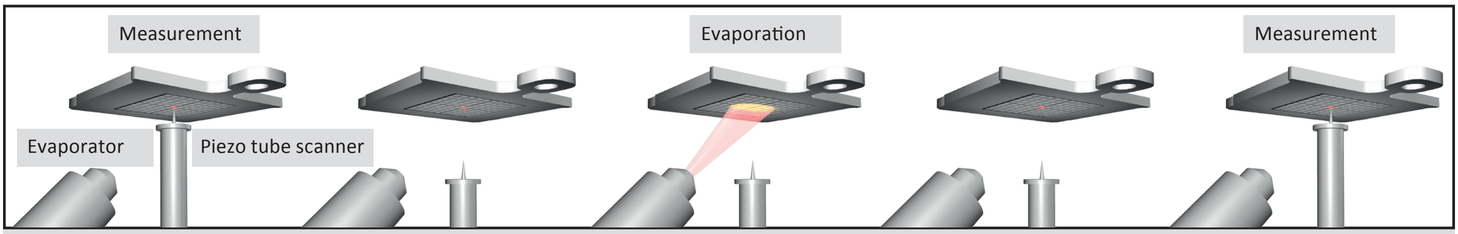
Combined with the intrinsic stability the LT STM (z<1 pm) leads to ultra-stable conditions which are needed in experiments such as grid spectroscopy or QPlus© nc-AFM experiments.



Extremely low thermal drift of 0.25 Å/h in thermal equilibrium.
Series of images acquired over a period of 19 hours at T = 4.7 K. STM on Si(111) 7x7, 6.45x6.45 nm. The white cross marks the Si corner hole position at the beginning of the measurement. No software drift correction has been employed.

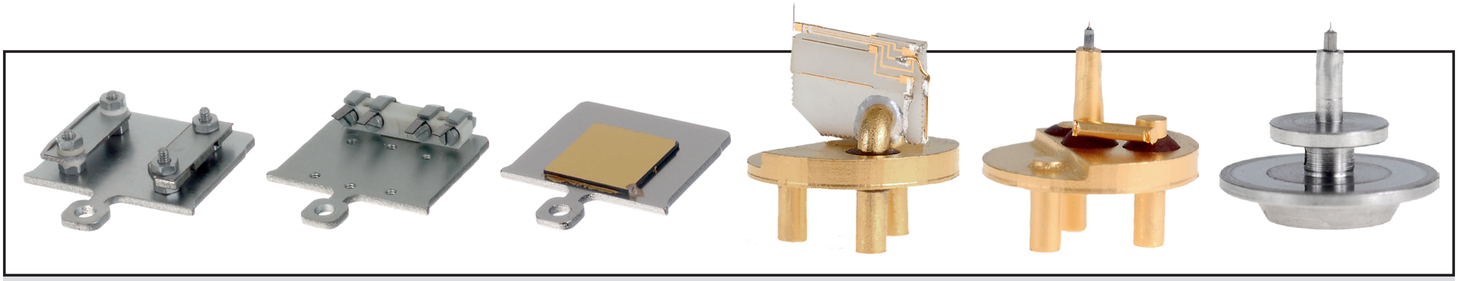


Reliable repositioning accuracy after full retract, needed for exact in-situ evaporation experiments.
Repositioning of the tip within less than 25 nm when rectracting the tip more than 5 mm

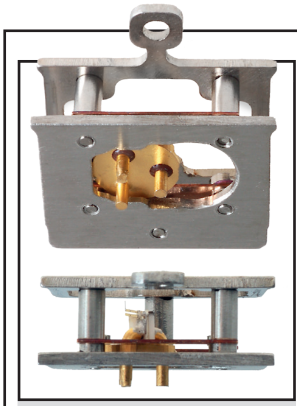


The LT STM incorporates a unique 3D tip positioning design ensuring completely independent movement in X, Y and Z. The 3D positioning unit consequently allows precise tip positioning in the micrometer range. The guided positioning within a range of X/Y/Z = 5x5x10 mm allows tip coarse re-approach with an ultra-small lateral shift (typically < 50 nm) for several hundred coarse steps.

LT STM - Versatility & Ease of use

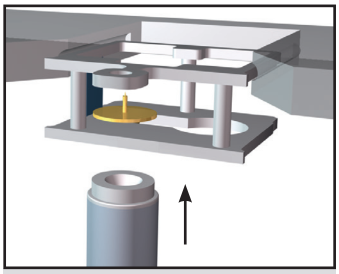


Direct current heating | 4 electrical contacts | Standard sample plate | QPlus© AFM sensor carrier | STM tip carrier (QPlus© version) | STM tip carrier (STM version)

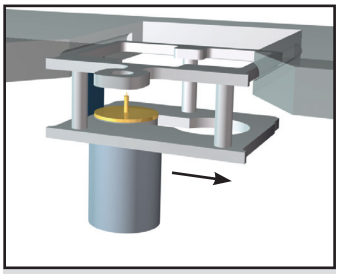


The LT STM tip holder allows for easy mounting of any tip material by simple clamping and is magnetically fixed at the scanner.

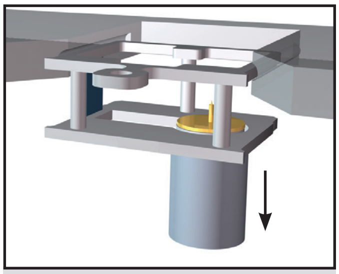
The transfer plate allows access for various tip preparation techniques such as sputtering and e-beam heating, while keeping the sensor holder itself in a secure position at all times.



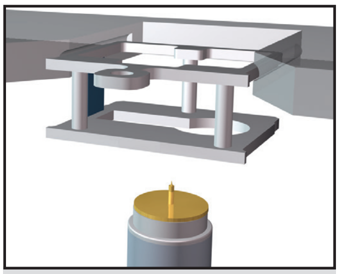
The transfer plate with a new sensor is inserted into the sample stage.



The scanner is moved up to pick up the sensor.



The scanner moves the sensor out of the keyhole of the transfer plate.



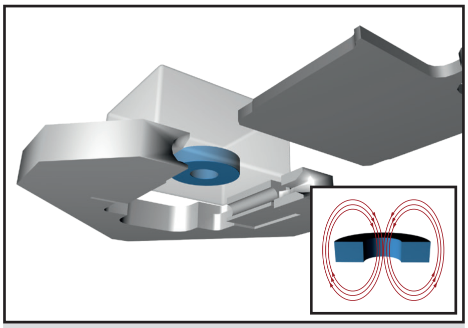
The scanner is moved down and the sensor is successfully mounted on the scanner.

Easy and Safe Sensor Exchange

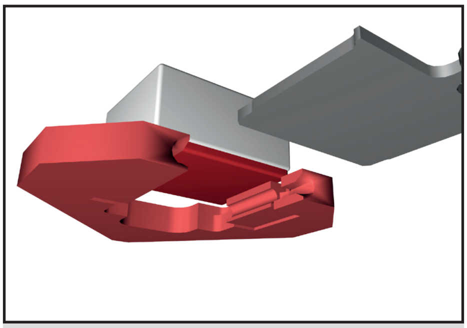
Sensors are exchanged under remote-control using Scienta Omicron’s patented piezo-inertia coarse positioning drives.

A sensor is transferred through the UHV system on a transfer plate with a, keyhole‘ cut-out and a magnet to secure the sensor. The sensor is picked up by the scanner using the remote-controlled coarse motors with observation via a long focal length CCD camera.

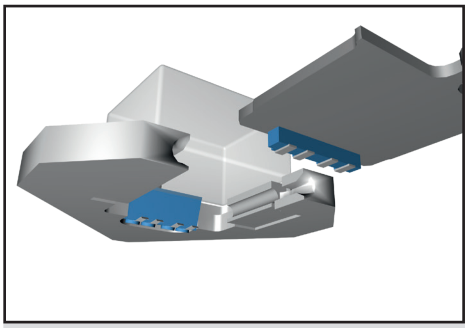
The risk of mechanical damage is reduced to a minimum and sensor exchange is typically carried out within a few minutes.



Magnetic Fields
Based on a magnet coil located behind the sample plate, vertical fields can be generated in the LT STM. The use of superconducting wires avoids heat generation during operation. Coil options for pulsed fields or DC fields are available.



Variable Temperatures
The LT STM is equipped with a built-in PBN heater element and a Si diode for temperature measurement. The heater enables quick temperature variation between 5 K to ~ 60 K (LHe operation) and 78 K to ~ 250 K (LN_2 operation).



Sample Contacts
The option for 4 spring-loaded electrical sample contacts provides flexibility to drive experimental devices, measure signals or apply additional potentials.

MULTIPROBE LT UHV system - The system concept

The MULTIPROBE LT UHV systems are dedicated surface science systems for the low temperature UHV STM. Three standard MULTIPROBE LT configurations are available – S, XP and XA.

Each standard system can be used as a base to match the customer's special requirements. The LT S represents the basic system configuration with the LT STM main chamber and an easy to operate fast entry chamber. Transferring samples and probe tips is made quick and reliable using a UHV wobble stick.

The LT XP system is an extended version of the LT S offering a separate chamber for various sample preparation and analysis techniques. These could include sample heating, sputter cleaning, evaporation/deposition and analysis techniques such as LEED and RHEED.

The LT XA system provides an extended sample preparation/ analysis chamber for a variety of surface analysis techniques such as ARPES, XPS, UPS, ISS, LEED, AES or others.

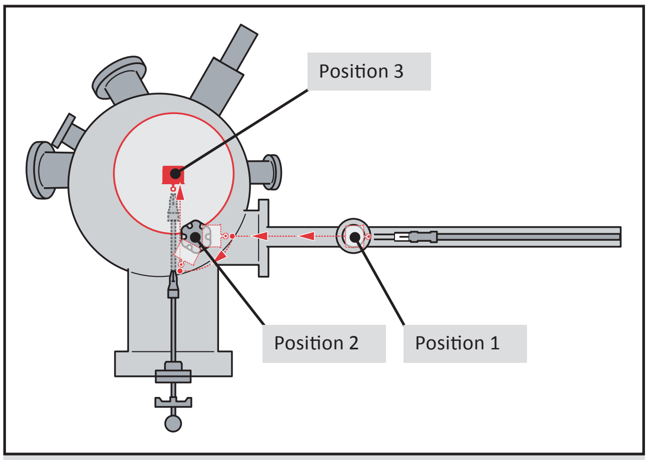
The MULTIPROBE LT XA can also be equipped with a fast cold sample transfer to keep the sample well below 10 K during all UHV operations.

Scienta Omicron UHV systems are optimized for high throughput, reliable and secure operations. The wobble stick based transfer in the LT STM microscope provides for fast sample exchange (< 30 s) with the sample either cooled or at room temperature.

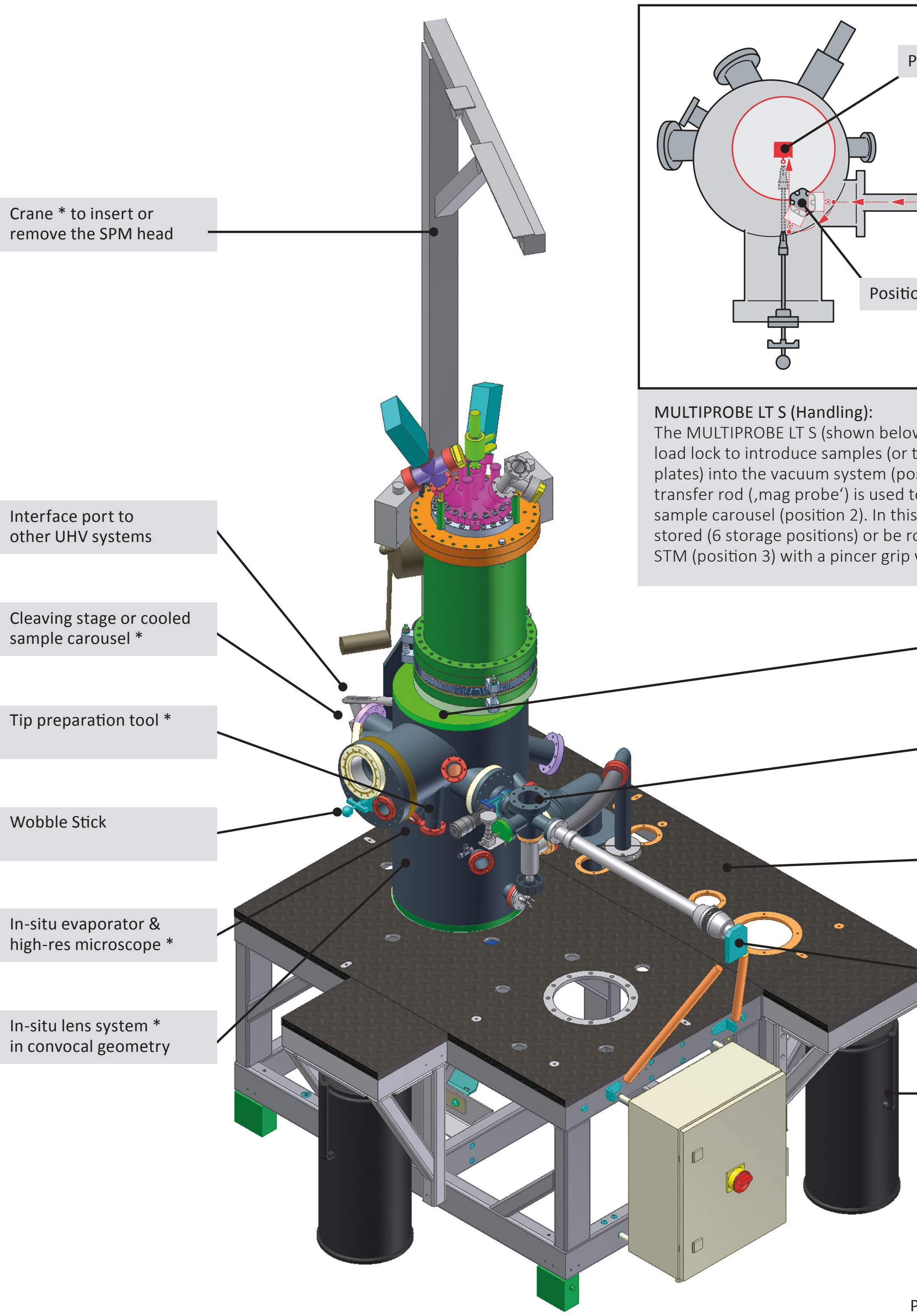
The MULTIPROBE LT UHV system

scientaomicron

LT STM - General Layout and Variants



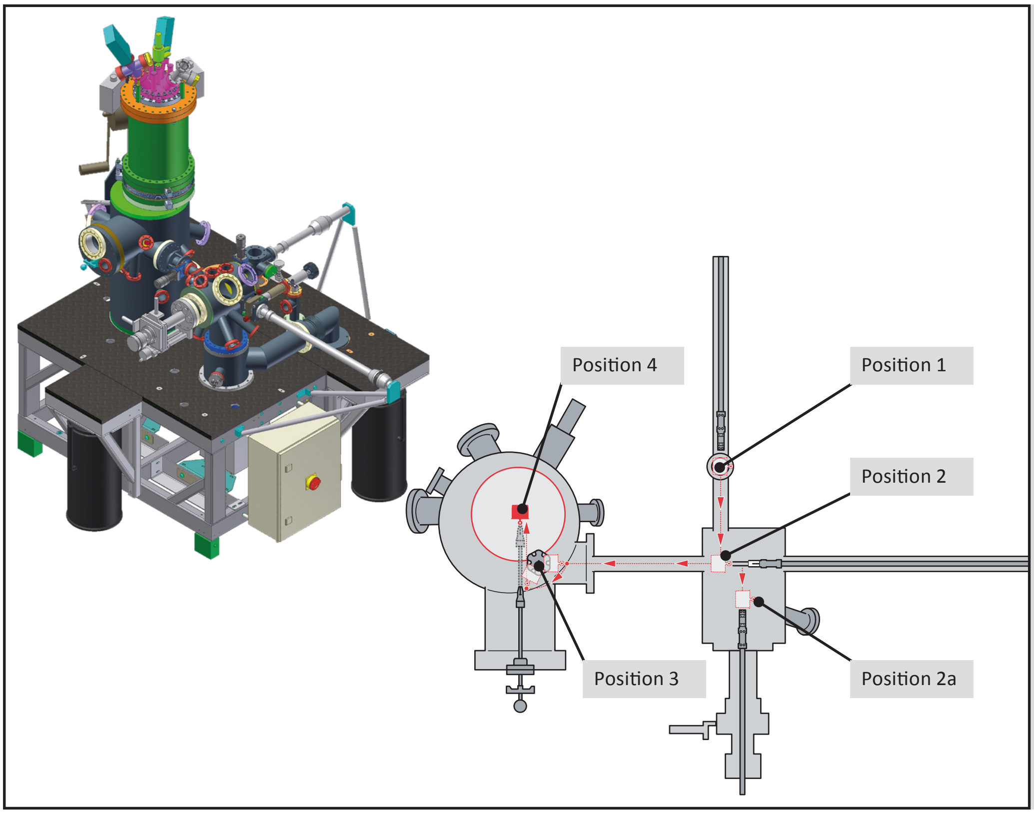
MULTIPROBE LT S (Handling):
The MULTIPROBE LT S (shown below) is equipped with a fast entry load lock to introduce samples (or tips via Scienta Omicron tip transfer plates) into the vacuum system (position 1). A magnetically coupled transfer rod (‚mag probe‘) is used to transfer the sample into the sample carousel (position 2). In this position, the sample can either be stored (6 storage positions) or be rotated and transferred into the LT STM (position 3) with a pincer grip wobble stick.



Please note: options are marked by * and can be upgraded at any time

The LTM STM

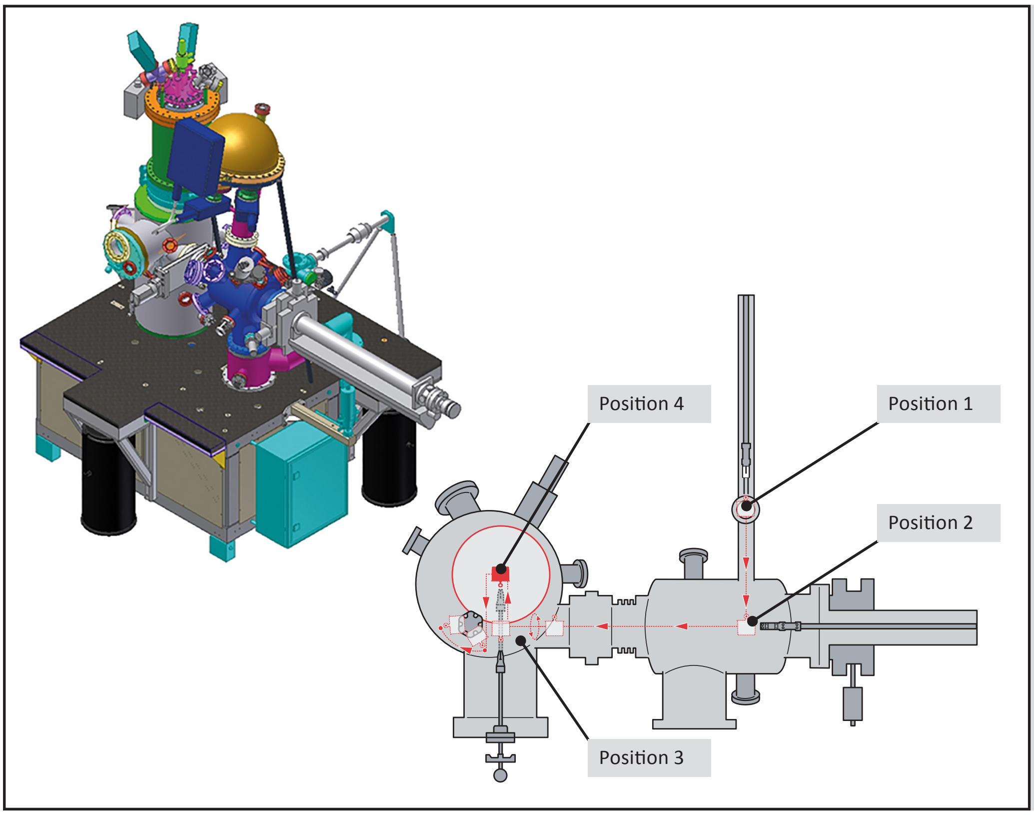
MULTIPROBE LT UHV system - The system concept



MULTIPROBE LT XP
(with XP-type preparation chamber)
Additional features compared to LT S:

- UHV sample manipulator, various heating and cooling options available.
- Ports for e.g. sputter source, evaporators, and LEED or RHEED for in-situ growth characterisation.

Handling:
The MULTIPROBE LT XP is equipped with a fast entry load lock to introduce samples (or tip transfer plates) into the vacuum system (position 1). A mag probe is used to transfer the sample to position 2.
A second mag probe transfers it to a high precision sample manipulator (LN2 or LHe cooling and various heating options available) at position 2a. This position allows extensive sample preparation with system ports configured for sputter sources, evaporators and more. Similar to the LT S system, the second mag probe can also transfer the sample into position 3, where the sample can be either stored in the carousel or be rotated and transferred into the LT STM (position 4) with a pincer grip wobble stick.



MULTIPROBE LT XA
(with XP-type preparation chamber)
Additional features compared to LT S:

- High-stability UHV sample manipulator with various heating and cooling options, specifically LHe cooling for cold transfer into the LT STM
- Ports for e.g. sputter source, evaporators, energy analyser (ARGUS CU for XPS and R3000 for UPS/ARPES), X-ray or VUV-sources, and LEED or RHEED

Handling:
The MULTIPROBE LT XA is equipped with a fast entry load lock to introduce samples (or tip transfer plates) into the vacuum system (position 1). A mag probe is used to transfer the sample to a long travel, high precision manipulator (LN_2 or LHe cooling and various heating options available) at position 2. This position allows for both extensive sample preparation and analysis. The manipulator then transfers the sample into position 3, where the wobble stick is used to directly transfer the sample from the manipulator into the LT STM (position 4). Alternatively, the sample can be stored in a carousel with up to 6 sample positions. Using a pre-cooled wobble stick and LHe cooled manipulator, this concept allows for fast cold sample transfer to keep the sample well below 50 K during all UHV operations.

LT STM - Combinations with ESPEC, MBE & more

Scienta Omicron´s 30 years of experience and know-how in UHV system business is embodied in the MULTIPROBE system family. The famous MULTIPROBE system design has proven itself in over 1 000 installations and forms the core module for multi-technique UHV applications. The platform of the MULTIPROBE XA combines various surface analysis techniques including SPM, XPS, UPS & ARPES.

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Customized solution
Our design expertise supports tailored solutions and provides combinations in a wide range of methods and techniques in one systems, as shown in our 'Materials Innovation Platform'.

R3000 for ARPES*

- Fast band mapping
- New and improved field calculations for optimal electron optics performance
- Lens acceptance angle +15°, angular resolved range ±10°
- Variable dispersion

ARGUS CU for XPS

- Excellent sensitivity
- Compression lens
- True counting Multi-Anode Detector
- Linear response up to the highest count rates
- Excellent dynamic range
- Snapshot and dynamic XPS
- Chemical state mapping

Lab10 MBE for surface science

- Research tool for innovative material development
- Configurable and customisable
- Low cost of ownership
- Growth process controlled

ARGUS CU XPS Analyser - Discover the Dynamics in XPS

Analyser Concept
ARGUS CU is a next generation hemispherical analyser with multichannel detection technology developed for uncompromised XPS and ESCA analysis. It is a multi-purpose easy-to-use electron spectrometer with excellent transmission and outstanding sensitivity. This design opens up the route to a wide range of exciting new electron spectroscopy experiments such as real time observation of dynamic processes and stroboscopic experiments (dynamic XPS).

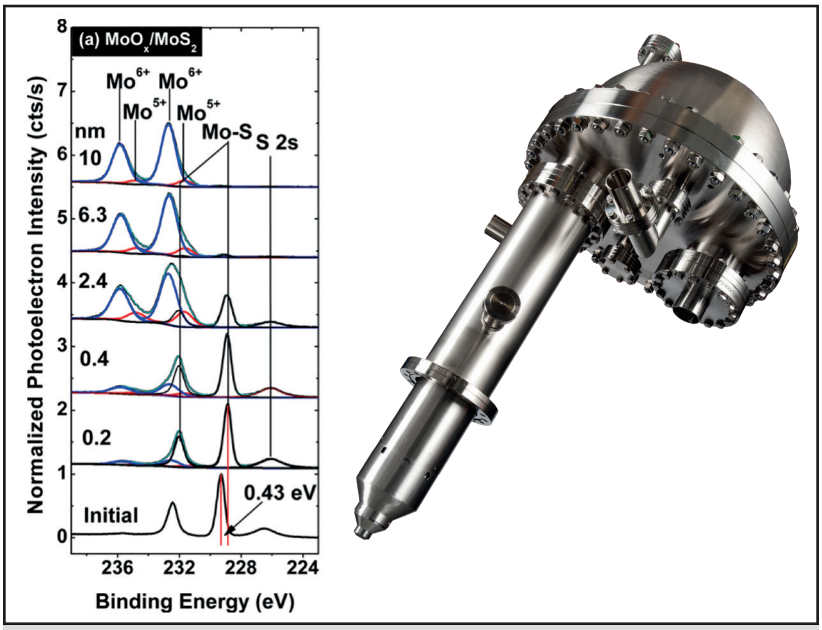
Rapid and reliable quantitative analysis rely on high sensitivity detectors and well characterized high-transmission electron optics in all parts of the spectrometer from the lens entrance to the detector surface.

The unique multi-anode detector employs 128 individual counters connected to a stripe-anode array. The design provides dedicated pre-amplifiers connected to each of the anodes allowing for low noise and therefore high detection efficiency which results in optimum data acquisition rates.

Well defined small spot analysis is guaranteed by a dedicated and easy-to-use aperture mechanism. The combination of a double aperture mechanism and a fully characterized magnification lens ensures defined area analysis from several mm down to <60 µm diameter without crosstalk from the surrounding area.

While imaging XPS ensures navigation and identification of inhomogeneous samples the multi channel detector increases analysis speed and provides modes e.g. for dynamic process analysis.

Interface chemistry and band alignments
The system is equipped with a monochromated Al Kalpha source and an Omicron ARGUS electron spectrometer. To obtain high resolution spectra a pass energy of 15 eV was used. After XPS measurement of the pristine material, MoO_x was deposited from an e-beam evaporator.
The thickness of the MoO_x films were calculated based on signal attenuation of the S2p and Se 3d levels with the appropriate electron attenuation lengths. The local variations in the band gap and the position of the Fermi level correlate with the local material composition. Thereby, band bending can be determined via XPS with the use of binding energy shifts. Additionally, broadening of the substrate signals can be accounted to island growth of the MoO_x layer, due to inhomogeneous surface potentials influencing the emitted photoelectrons.



Evolution of the Mo 3d core level and the overlapping S 2s and Se 3s core levels for MoO_x on MoS_2.

Publication: Stephen McDonnell et al., ACSNano, Vol.8, 6, 6265-6272 (2014)

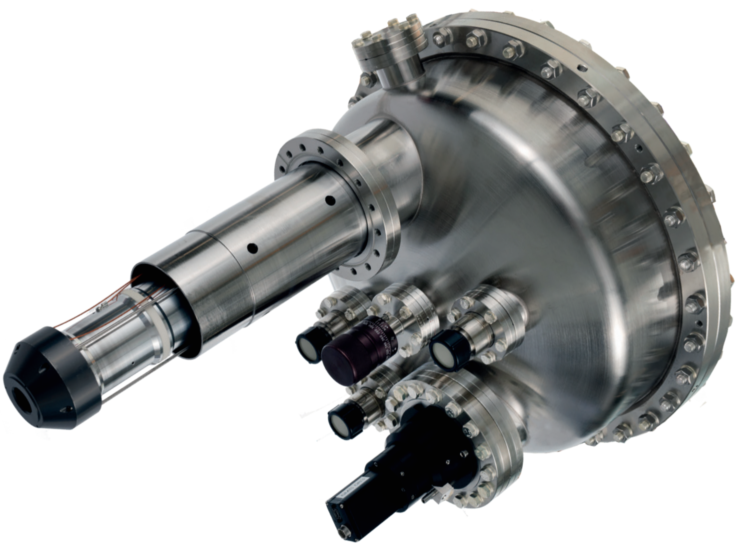
R3000 ARPES Analyser - Maximum Performance, Minimum Size

Scienta Omicron spectrometers have always opened new possibilities in electron spectroscopy. The Scienta Omicron R3000, designed to combine minimum size and maximum performance, is no exception.

The Scienta Omicron spectrometers have always pushed the boundaries of what is possible within electron spectroscopy. These state of the art instruments have for example revolutionised the angular resolved photoemission experiments (ARPES) used to investigate superconductivity. This was achieved by inventing a spectrometer capable of measuring kinetic energy and momentum of photoelectrons simultaneously. [1]
The high quality and reliability of the Scienta Omicron spectrometers are most clearly seen by the impressive number of publications in high ranked scientific journals. [2]

Highly Flexible Analysis Tool

The Scienta Omicron R3000 is optimised for quick PES measurements and band mapping. It features a modern FireWire CCD camera detection system for high data transfer speed and easy upgrade. The high voltage electronics is designed for ultrahigh stability, to provide for reliable and accurate measurements. The Scienta Omicron R3000 can be operated in Quick Mode, where a spectrum can be recorded within seconds by taking a snap shot of the detector image, covering 12 % of the pass energy. The high count rate of the Scienta Omicron R3000 is accomplished by combining a large acceptance angle, an analyser radius of 135 mm and an MCP detector as large as the one in our 200 mm analysers. At the same time the outer dimensions of the spectrometer are small, for easy fit to an existing vacuum system. This is accomplished by using a mu-metal vacuum vessel.



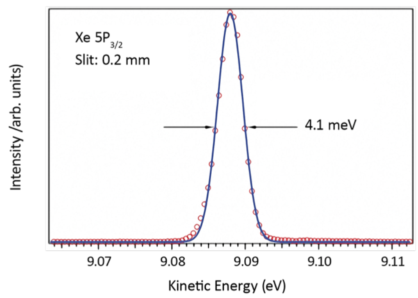


Image on top: R3000 for ARPES
Image low left: Xe $5p_{3/2}$ measured at 2 eV pass using a 0.2 mm entrance slit. The experimental width was 4.1 meV, which gives an instrument resolution of 2.4 meV. Excitation source: Scienta Omicron UV source, HeIα.

Scienta Omicron R3000 for XPS/UPS

- New design, high throughput lens
- Optimised transmission for high intensity in UPS, XPS or synchrotron mode
- Real time detector monitor
- Fast and easy experiment optimisation
- Reliable and reproducible

Scienta Omicron R3000 for ARPES

- Fast band mapping
- New and improved field calculations for optimal electron optics performance
- Lens acceptance angle ±15°, angular resolved range ±10°
- Variable dispersion

[1] SCIENCE, Vol. 310, p. 1271, 25 November 2005
[2] http://www.scientaomicron.com/en/publications

R3000 ARPES Analyser - Maximum Performance, Minimum Size

The Lab10 MBE system is a turnkey small sample research tool for innovative material development under UHV conditions.

This system is designed to fulfil the highest and most stringent requirements of modern thin-film deposition. Furthermore, the small sample concept is intended to interface the MBE system with an UHV analysis module to offer the best platform for fundamental research of novel materials.

Flexible System Platform

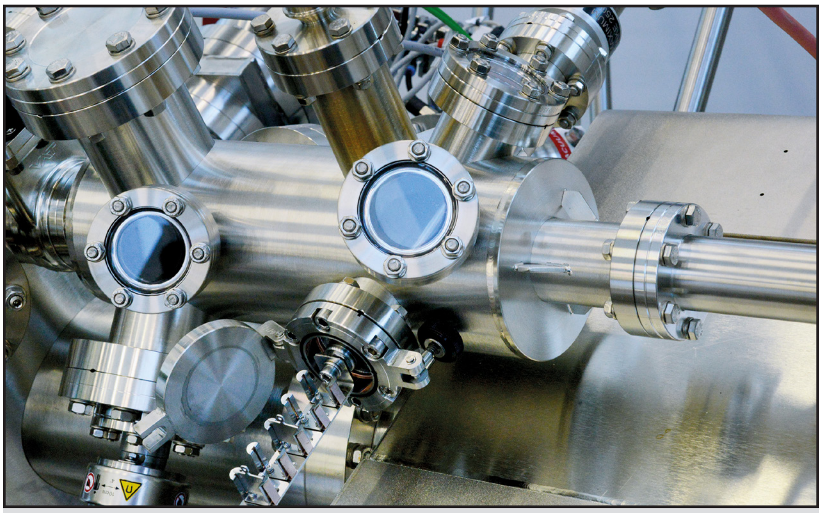
The Lab10 MBE system is designed for forefront research. It is a proven platform with more than thirty of such small-sample systems installed worldwide. Our customers use their systems for a variety of material systems, such as:

- Semiconductors
- Organics
- Topological Insulators
- 2D Materials
- Oxides
- Intermetallic Compounds
- Heterostructures
- Thin Film Solar Cells

Applying our wide range of expertise, we can offer the best possible solution for every intended purpose. Our local Scienta Omicron sales representatives are trained to assist you in the configuration of your individual system.

The system consists of a deposition chamber and an access chamber for sample introduction. The deposition chamber is equipped with an efficient cryopanel and an exchangeable cluster flange. It can be equipped with a wide range of high quality effusion sources. Additional ports for in-situ growth control and viewports are prepared.

The Lab10 MBE includes the MISTRAL control system together with a powerful evaporation control software. The control system is based on certified standard components for supreme reliability and provides a graphical status overview of all sensor values. With this software bundle, experiments can be conducted under well-controlled and reproducible conditions.



The access chamber of the Lab10 MBE system is designed to accept five Scienta Omicron small sample plates, an optional heater stage and a sputter or effusion source. It can be upgraded to a dedicated preparation chamber by adding a separate fast entry lock.

The Lab10 MBE system employs the MISTRAL control system with touchscreen or remote PC interface. Furthermore, safety interlocks protect the UHV system in case of power failure.

Technical Data

Specifications:	
Tip coarse positioning range X/Y/Z:	5x5x10 mm (orthogonal independent)
Sample size:	10x10 mm (standard sample plates)
Gap voltage:	+/- 1 V and +/- 10 V (smallest increment 30 µV & 300 µV
Tunneling current:	1 pA to 300 nA with feedback loop active
Operational temperature range:	5 K up to RT, with counter heating
LN2 operation:	
Temperature in STM & QPlus© AFM mode:	T < 78 K
Resolution in STM mode:	Atomic resolution on Au(111)
Resolution in QPlus© AFM mode:	Atomic resolution on single crystal NaCl(100)
Scan range X/Y/Z:	4x4x0.4 µm
Cool down time:	< 2 h for T < 100 K
LN_2 hold time:	> 200 h
LHe operation:	
Temperature in STM & QPlus© AFM mode:	T ≤ 5 K (± 0.25 K)
Resolution in STM mode:	Atomic resolution on Au(111)
Resolution in QPlus© AFM mode:	Atomic resolution on single crystal NaCl (100)
Scan range X/Y/Z at 5 K:	1.8x1.8x0.2 µm
Cryostat hold time:	LN_2: > 75h LHe: > 65 h
Cool down time:	< 8 h for T < 6 K
Room temperature operation:	
Resolution in STM mode:	Atomic resolution on Au(111)
Resolution in QPlus© AFM mode:	Atomic resolution on NaCl(100)
Scan range X/Y/Z:	10x10x1.5 µm
Guaranteed base pressure:	$3x10^{-10}$ mbar (imaging of reactive
surfaces at RT)	

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