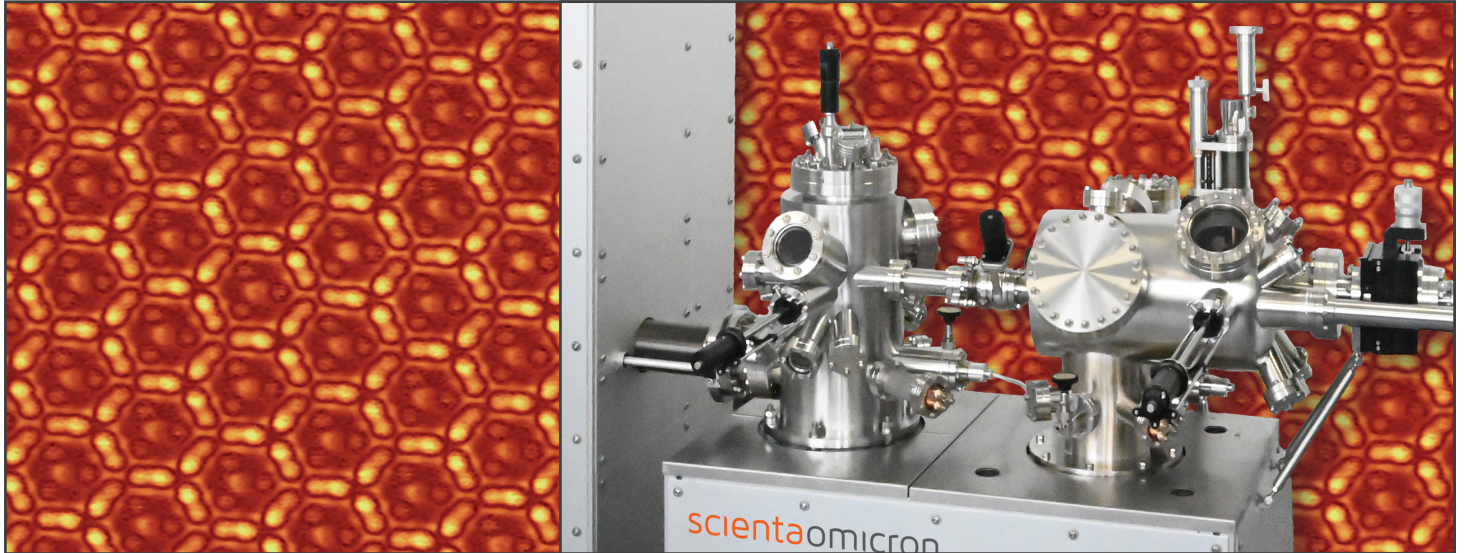


Closed Cycle UHV SPM



- STM, QPlus® AFM & Spectroscopy
- Integrated TRIBUS Head
- Temperature 10 K to 420 K
- No Helium Consumption
- Unlimited Measurement Time



The INFINITY SPM

The new INFINITY UHV SPM is a low-temperature SPM for high-resolution STM, QPlus[®] AFM, and spectroscopy experiments. A pulse tube cooler is employed to cool the UHV SPM in a new, unique design. The new cryostat has no moving parts in the cold head and very long service intervals. It belongs to the next generation of cryostats that are independent of cryogenic liquids. The handling of liquid helium or liquid nitrogen is no longer necessary, thus making the use of the instrument simpler and safer. The INFINITY SPM can stay cold for several months without the need for any maintenance of the cryostat.

For optimum mechanical decoupling, the SPM is mounted in a dedicated UHV chamber with ports for sample transfer, optical access and evaporators. The pulse tube cooler with critical noise level is located in a separate high vacuum chamber. In addition, the SPM head is mechanically decoupled by a spring suspension with eddy current damping.

The unique two-chamber design is the key to pm-stability in a temperature range from 10 K to 420 K. It incorporates mechanical decoupling units, sophisticated thermal connections, and a dedicated acoustic noise cancellation.

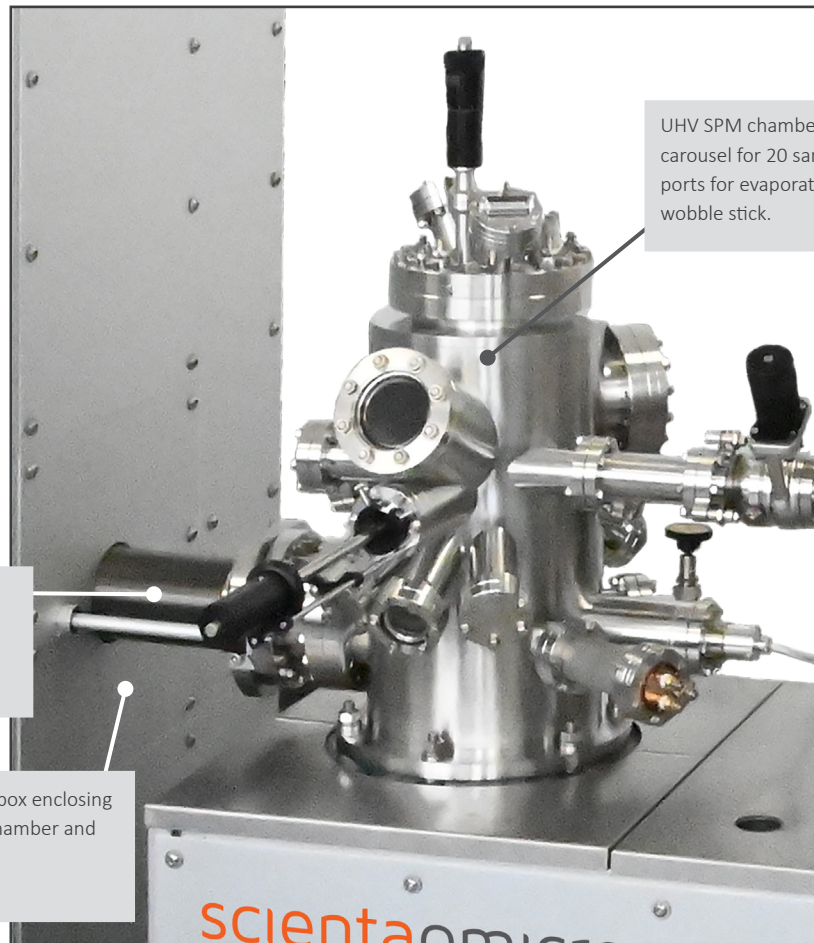
Benefits and Properties:

- Independent from liquid helium and liquid nitrogen. Only power and water are required to cool the instrument
- High operation safety: no need for handling of cryogenic liquids
- User-friendly: no filling/refilling of cryostats and no blockages – just press a button to cool the instrument to 10 K
- Quiet working environment
- Long (“infinite”) measurement time

Thermal connection with dedicated UHV feedthrough for transfer of cooling power.

Noise cancellation box enclosing the high vacuum chamber and pulse tube cooler.

UHV SPM chamber with SPM, storage carousel for 20 samples/tips and access ports for evaporators, CCD camera and wobble stick.

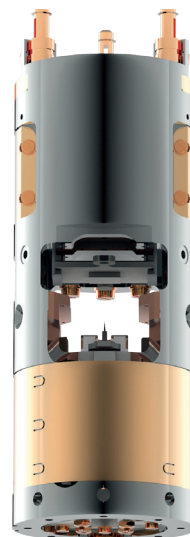


The Easy and Smart Choice for SPM at Low Temperatures



Electrical Contacts and Temperature Variation of the Sample

In addition to the main sample potential, the sample acceptor stage can have up to 10 additional electrical contacts. These contacts may be used for customised experiments or for use with the TVS sample plate for continuous variation of the sample temperature during analysis. The electrical contacts are protected against sample transfer damage.



The INFINITY SPM employs the TRIBUS SPM head with 3D coarse motion for tip/sample, high intrinsic stability, easy tip and sample exchange, and optical access.

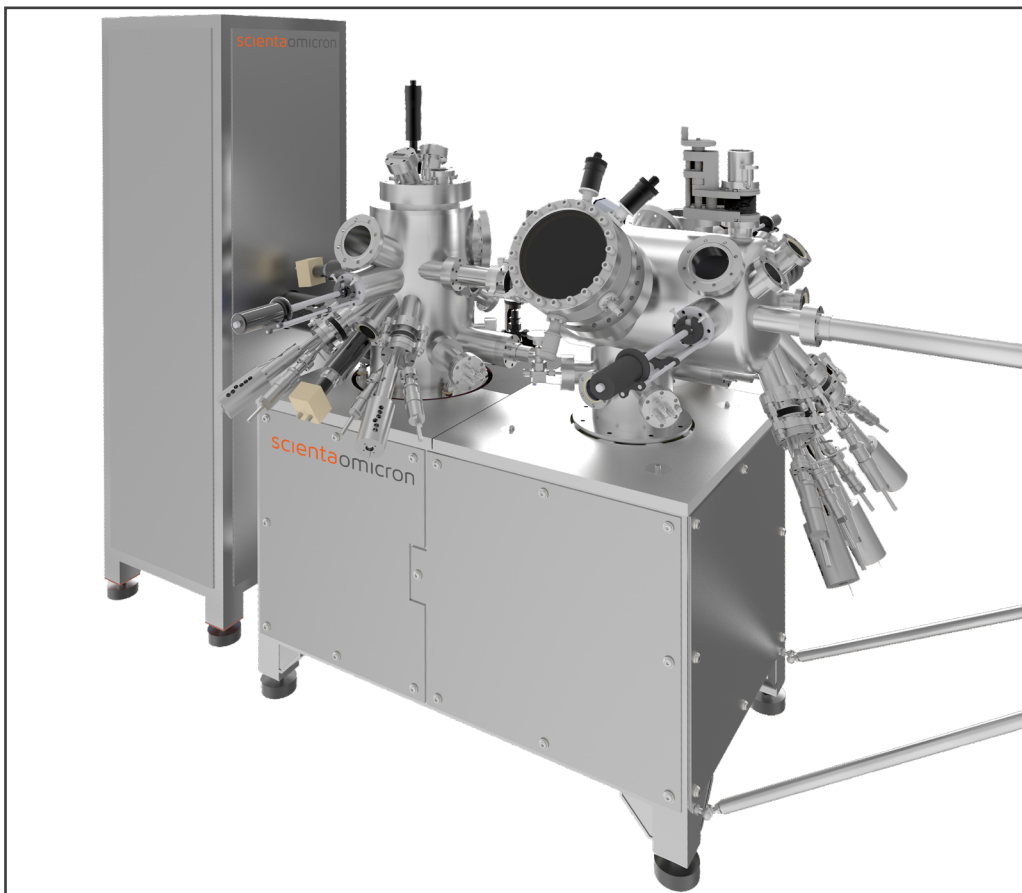
For more information on the TRIBUS head, please see the relevant technical information available.

Sensors and Samples

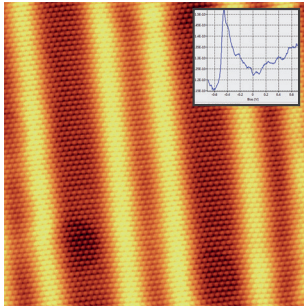
- In-situ tip/sample exchange via wobble stick
- Secure tip/sample handling
- QPlus® AFM sensors and STM tip carriers
- Standard flag style sample plates:
 - Mounting of metal singel crystals
 - Direct current heating for silicon samples
 - Sample plates with tapped holes
 - Various materials available
 - Sample plate with 4+1 & 10+1 electrical contacts
 - TVS sample plates for variable temperature operation

Optical Access for CCD Camera and Evaporators

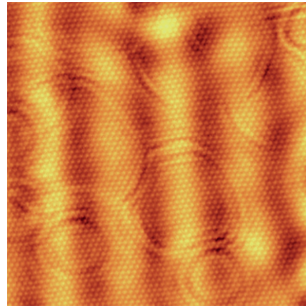
- Thermal shield with windows for optical observation
- Direct evaporation into the SPM
- Angle between evaporator and sample surface: 30°
- Evaporation from either rods or crucibles



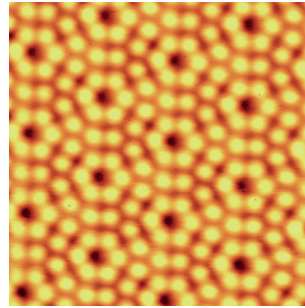
INFINITY UHV SPM system including a customised preparation chamber with LEED and evaporators, tip and sample preparation stage.



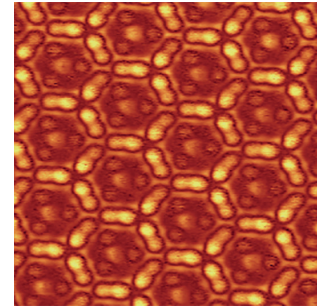
STM: Au(111) @ 9.6 K. Insert: dI/dV spectrum showing the Au surface state.



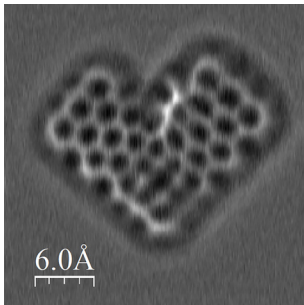
Corresponding dI/dV map of Au(111) at -280 mV.



STM: Si(111)7x7 at 10 K.

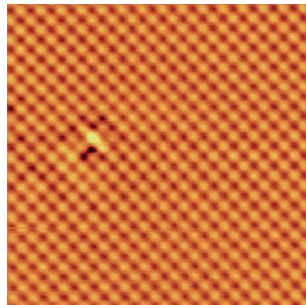


Corresponding dI/dV map of Si(111)7x7 at 1.8 V.

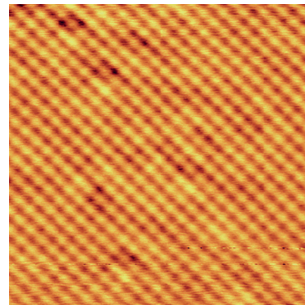


QPlus® with CO terminated tip at 9K: constant height frequency shift image of a porphyrinoid molecule on Au(111). (image processing: background subtraction only)

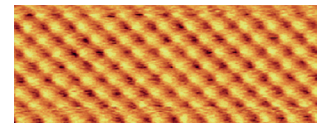
Data courtesy of Sylvain Clair, Christian Loppacher and Laurent Nony, Aix-Marseille Univ, CNRS, IM2NP, Marseille, France



QPlus®: NaCl(001) single crystal at 9.7 K with small oscillation amplitudes of 100 pm_{pp}.



QPlus®: NaCl(001) single crystal at 9.7 K with small oscillation amplitudes of 60 pm_{pp}.



QPlus®: NaCl(001) single crystal at 9.7 K with small oscillation amplitudes of 13 pm_{pp}.

Technical Data

SPM temperature	10 K - 420 K
STM	atomic resolution on Au(111) at T = 10 K
QPlus® AFM	atomic resolution on NaCl(001) or Si(111) 7x7 at T = 10 K
Cryostat Requirements:	
Ambient air temperature	5 to 35°C (for 28 - 35°C: only 90 % cooling power)
Power consumption	6.5 kW (steady) / 7.2 kW (maximum) 7.5 kW (steady) / 8.3 kW (maximum)
Cooling water	
Water temperature	4 to 28°C
Min. flow rate	7 l/min

Options:
 QPlus® AFM operation
 4 or 10 additional sample contacts
 STM tip preparation tool
 Customised preparation chamber
 Water chiller for cryostat

SPM Measurement Modes:
 - STM, STS, I(V), dI/dU, dI/dz
 - IETS
 - Spin-polarised STM and STS
 - QPlus® AFM, df(z), df(U)
 - Atom, molecule and nanoparticle manipulation

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