

Variable temperature UHV STM facility.

Facility Description

We have a Cryo-stm, operating in ultra-high vacuum and in the temperature range 6 - 400 K (liquid helium continuous flow system). The system facilitates in-situ sample exchange at all temperatures, with an optimum sample size 8×8 mm. The scan area at room temperature is 4×4 μm , reducing to 1×1 μm at base temperature. There is an independent x-y stage on the sample holder allowing movement of the sample of about 2 mm in each direction with nm precision. Up to eight electrical contacts can be made to the sample carrier and measured simultaneous to STM operation. The cooling time of the system from room temperature to 6 K is approximately 4 hours

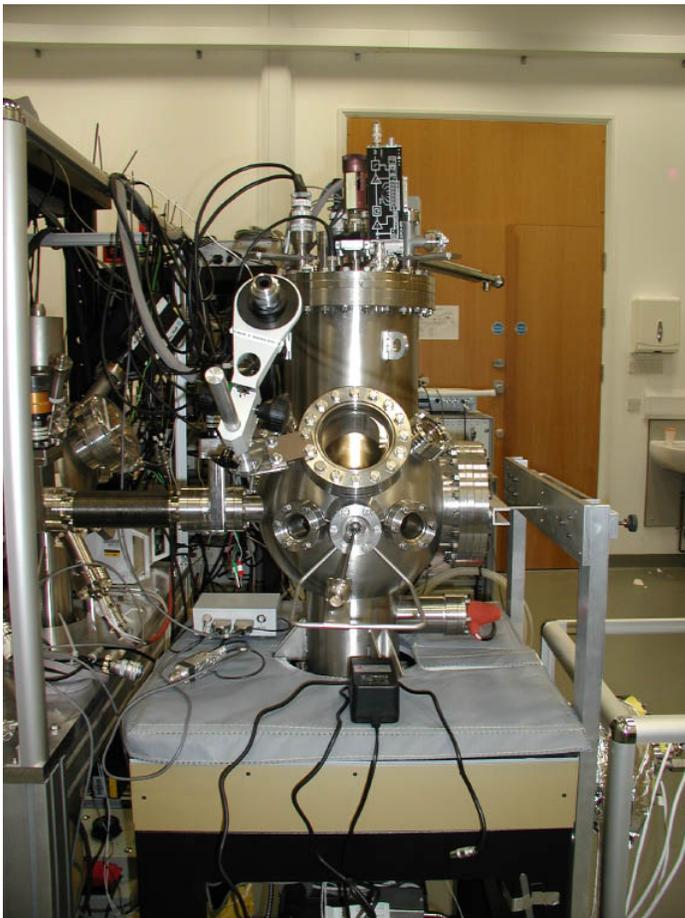


Figure 1: Main STM chamber on Active isolation mount

The STM is driven by Oxford Instruments TOPS III hardware/software. Data analysis is typically performed using SPIP (ImageMetrology) software or Labview (National Instruments) in-house routines.

The STM head is housed in a UHV environment as part of an extended vacuum system, consisting of four chambers:

STM head chamber:

Consists of STM head unit with radiation shields, ion and titanium sublimation pumps, mass spectrometer, sample/tip storage carousel.

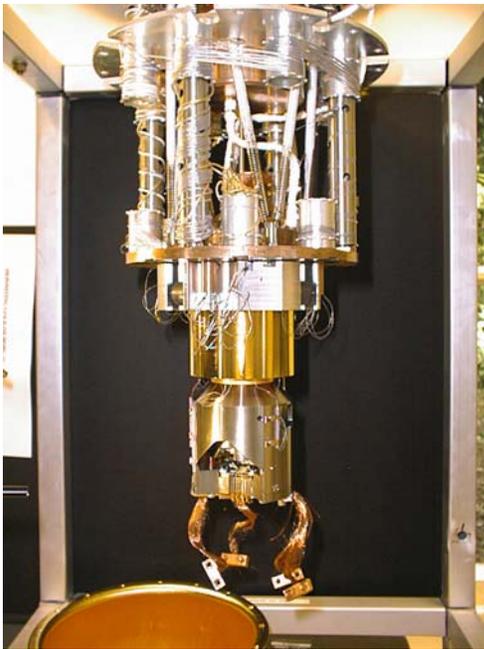


Figure 2: STM head removed from system

Sample preparation chamber:

Consists of dc and electron beam sample heating unit, surface cleaning using an Ar ion gun, STM tip conditioning by e-beam heating, main sample/tip storage carousel, mass spectrometer, ion and titanium sublimation pumps.

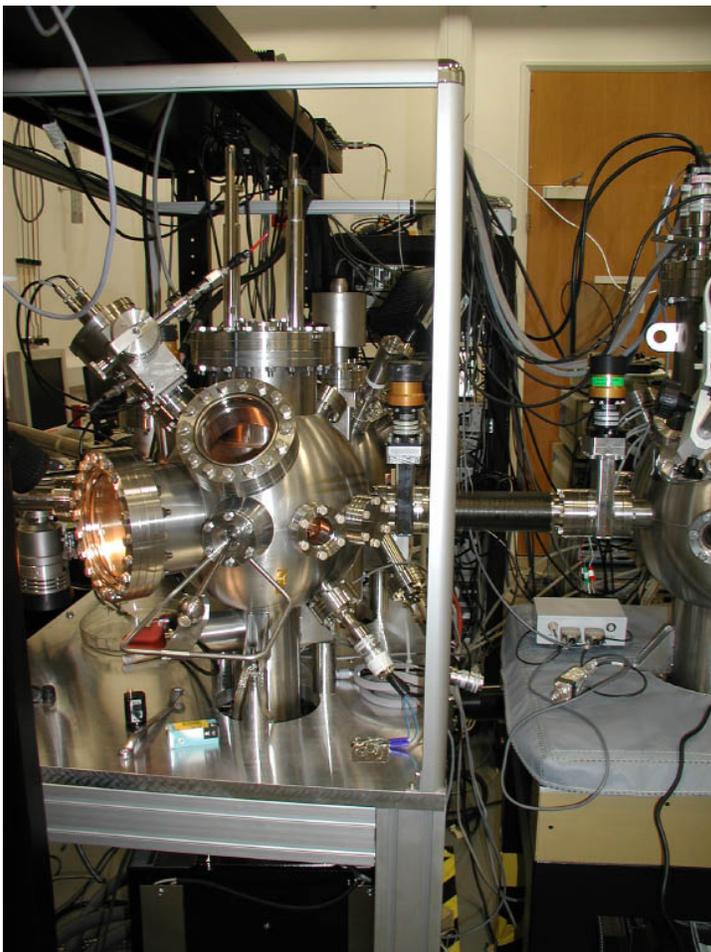
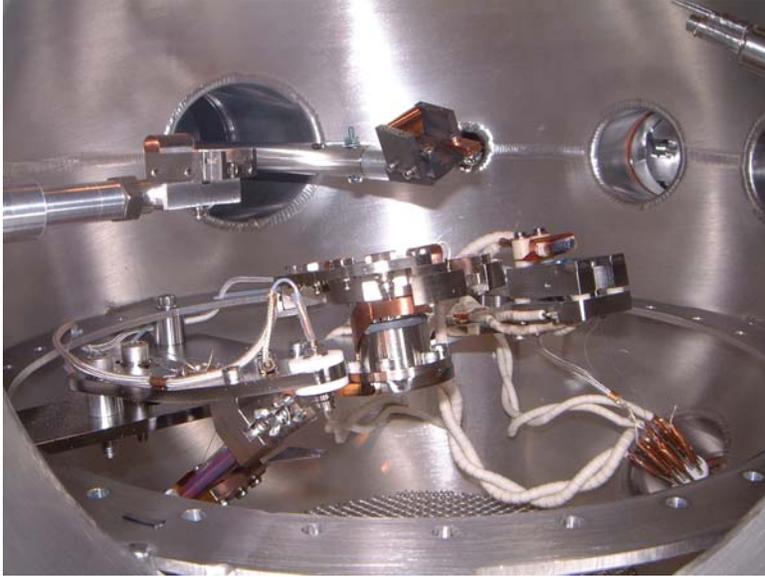


Figure 3: Prep chamber

Figure 4: inside of Prep chamber showing sample and tip heaters plus sample/tip manipulators



Deposition chamber:

Thin film material deposition by K-cell and Electron beam evaporators. A heated sample carrier (up to 1000C)

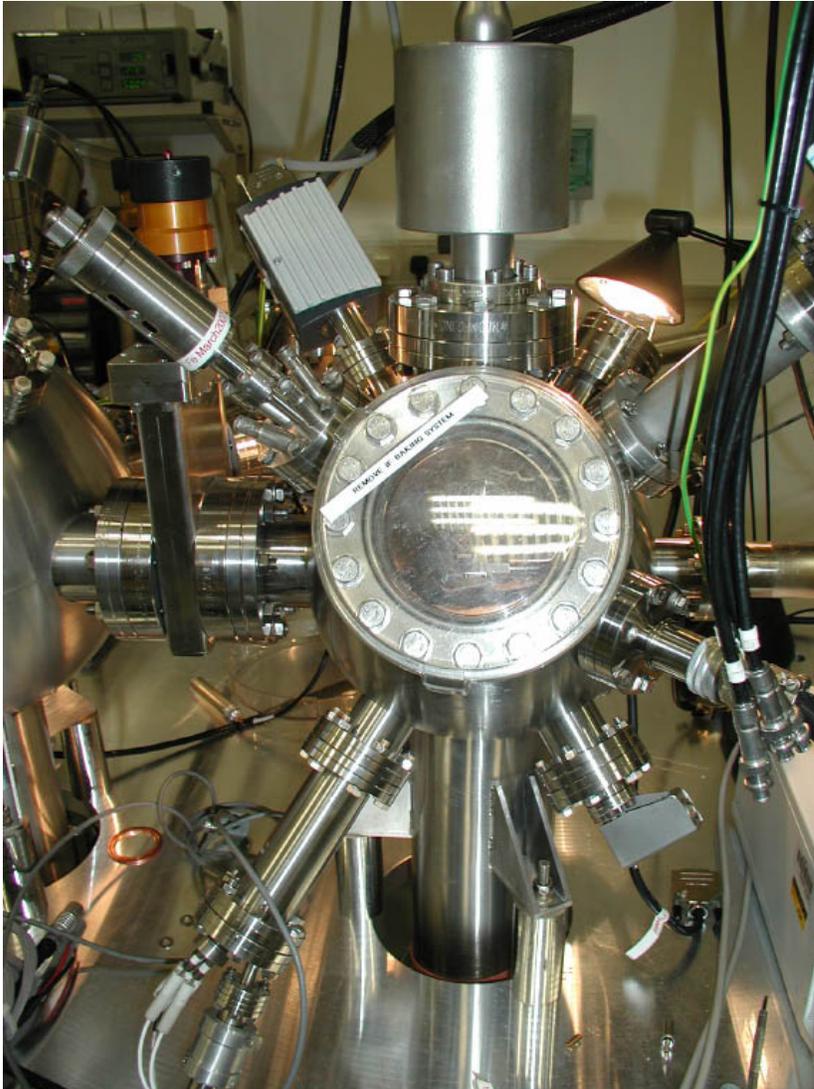


Figure 5: Evaporation chamber

Load lock:

Sample/tip carousel permits simultaneous loading of up to four sample carriers and tips.

Samples can be transferred to air and returned to the STM head in a time of approximately 60 minutes.

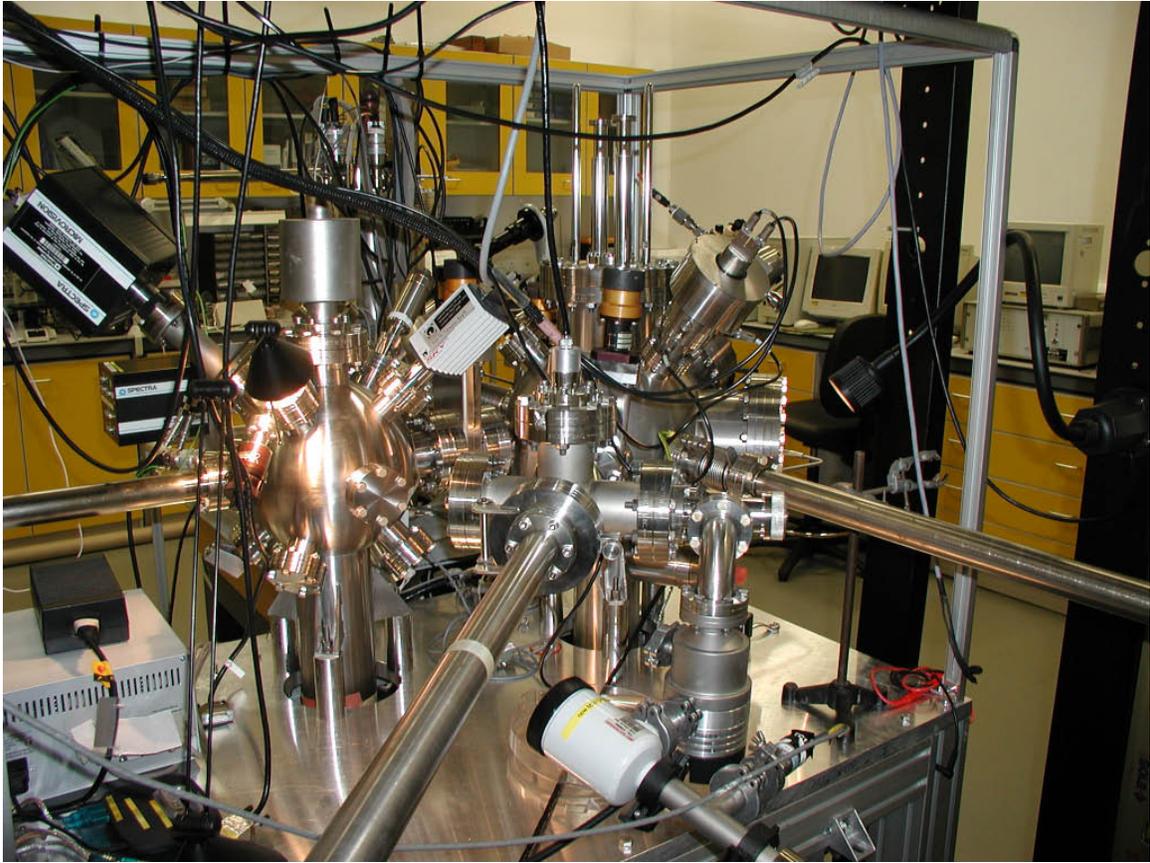


Figure 6: STM system showing load-lock and evap chambers