Conditions “atmosphériques” avec un Setup UHV ?

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Journées Thématiques « Molécules Organiques et UHV »

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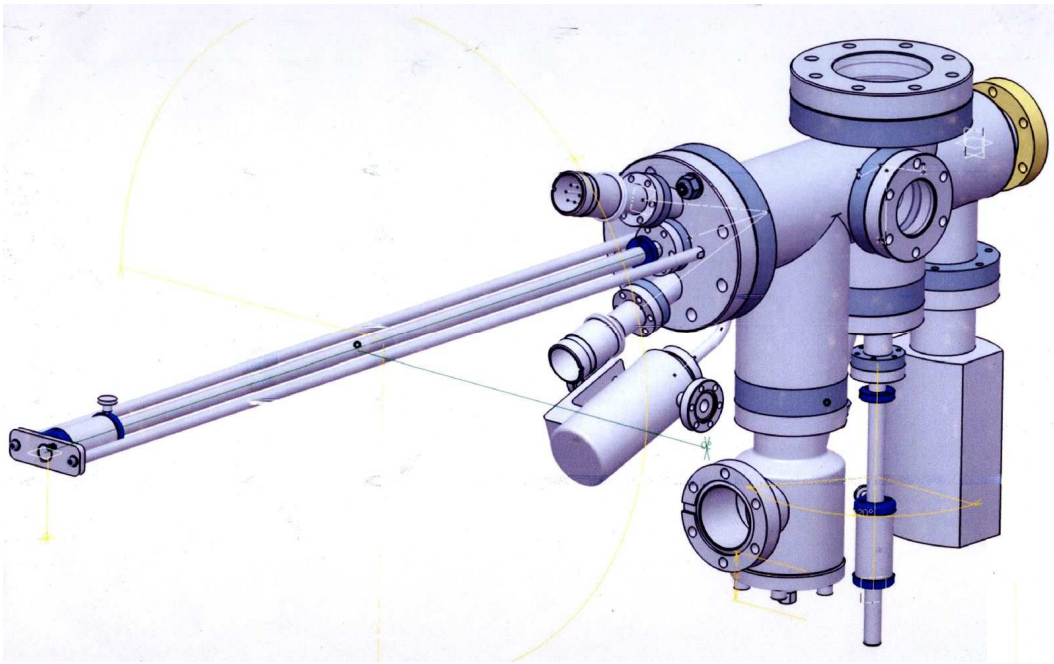
How to prepare *in-situ* : UVCS Cleaning Chamber

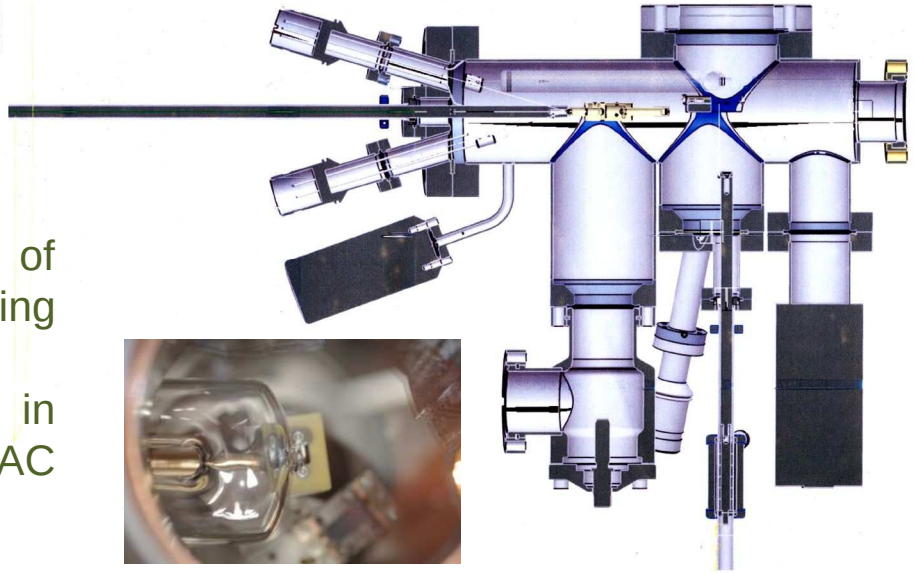


- ✓ UHV-Leak valve for gas supply
- ✓ Hot-Filament « cracker » integrated

This device enables for true *in-situ* analysis of samples undergoing UV or other processes requiring macroscopic pressure in virtually any UHV system.
It has been designed, engineered and realized in collaboration with TEMPO and FERROVAC (Switzerland).

SOLEIL UV-Cleaning Chamber :
Features:

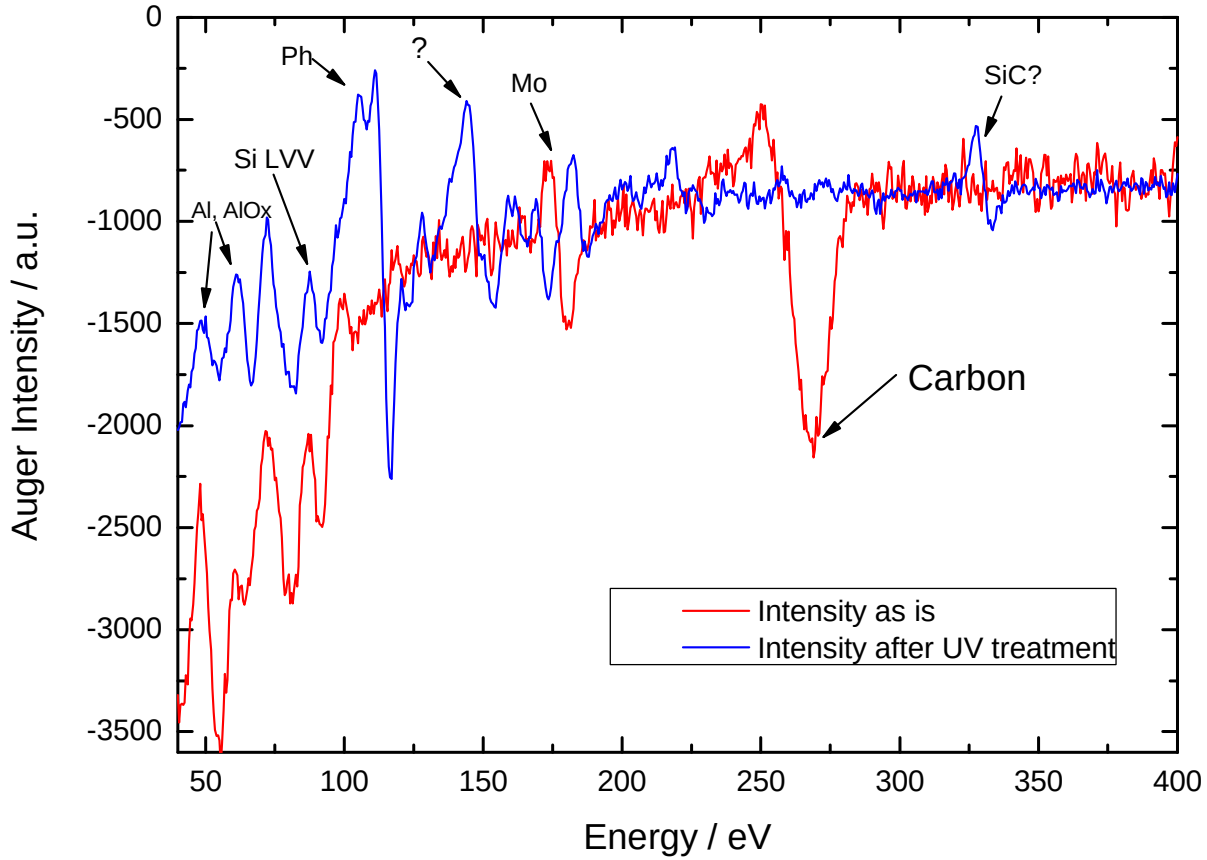
- ✓ Compact and versatile, **CF40** mount
- ✓ **UV-lamp integrated**
- ✓ Dedicated pumping and vacuum control
- ✓ Omicrom **standard sample**, sample heating option
- ✓ Pressure range from 10^{-10}hPa to **atmosphere**
- ✓ **Optical analyses** on dedicated viewport possible



Top view into chamber

Preliminary results obtained with the UVCS-Chamber

Auger Spectra of n-doped Si [100], carbon contaminated: as-is and after UV treatment

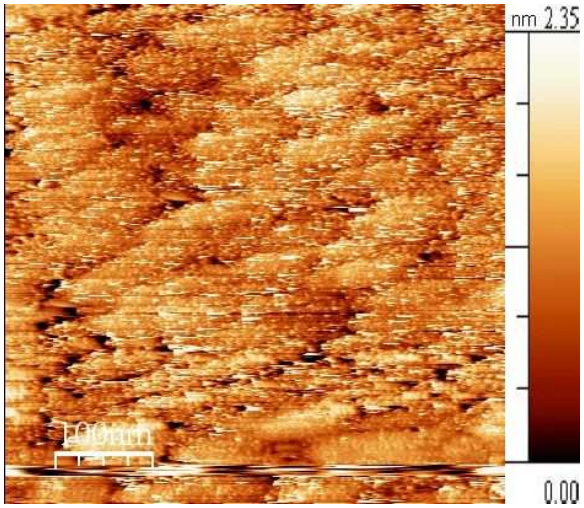


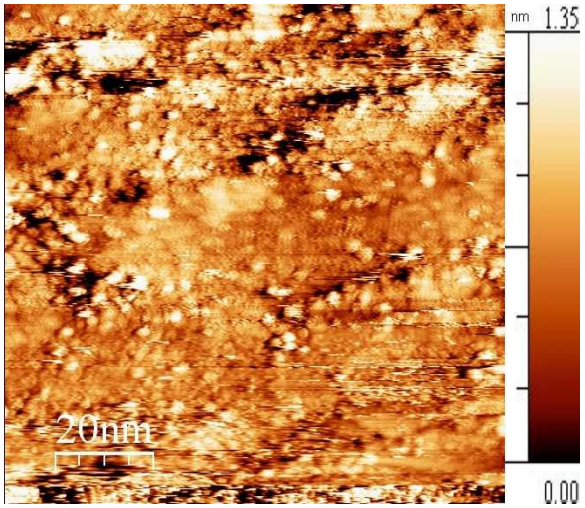
Auger-spectra (*Staib Desa100*) of an n-doped Si[100]-sample with carbon deposit as is (red) and after 2hours of UV-cleaning, 800hPa O_2 and at 3mm distance from the lamp (blue).

After UV-treatment, the carbon peak is gone while the phophorous doping of the Si-bulk prevails.

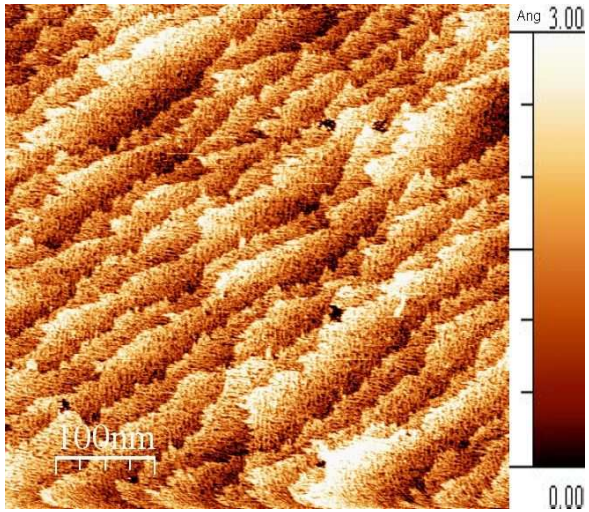
This sample has been analyzed by STM *in-situ.*

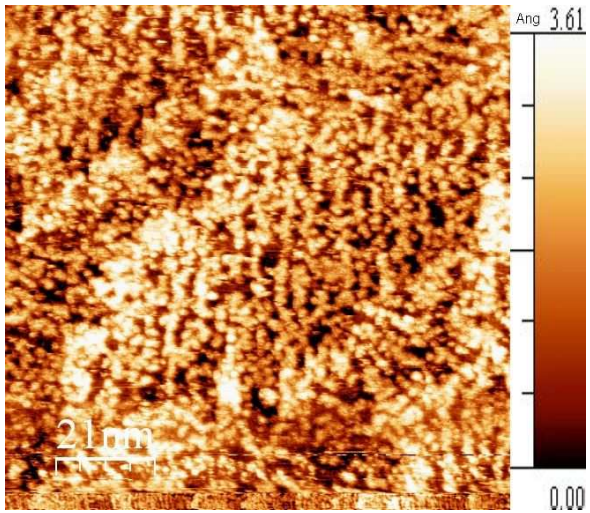
STM-analysis of UV-cleaned and flashed samples





STM on Si[100] with carbon deposit after UV-Treatment (U=-1,7V; I=0,7nA)

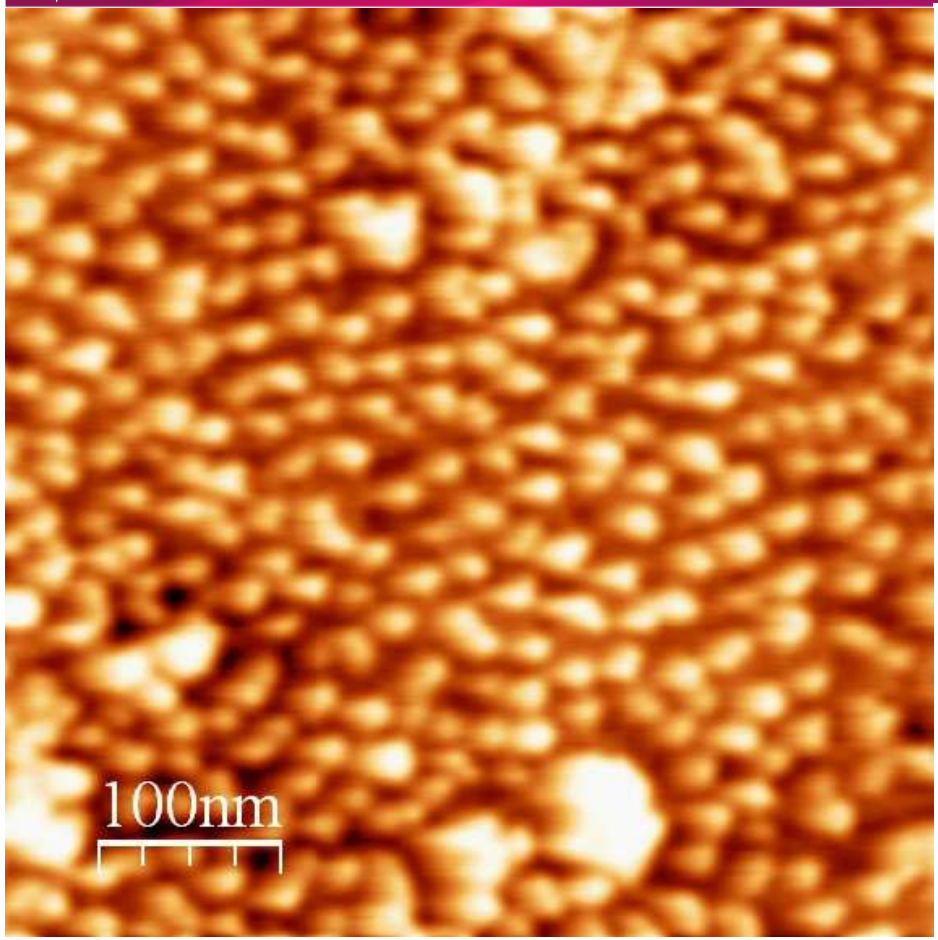


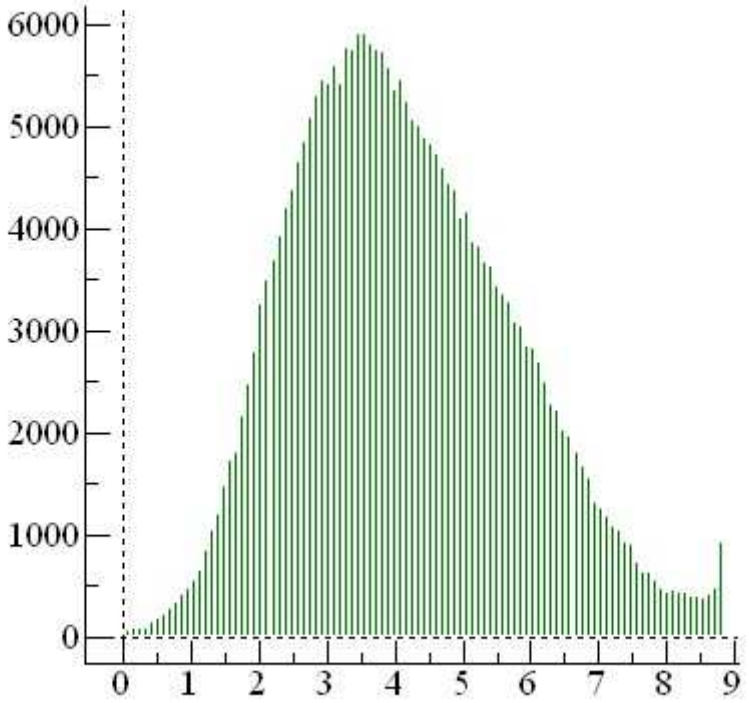


STM on Si[100] after UV-Treatment and four flashes up to 1150°C (U=-2,3V; I=0,8nA)

The height contrast in the STM images is **reduced by about one order of magnitude after flashing**, which is commensurate with the Auger-spectra.

Pt nanoparticles (NPs) supported on TiO_2(110) surface





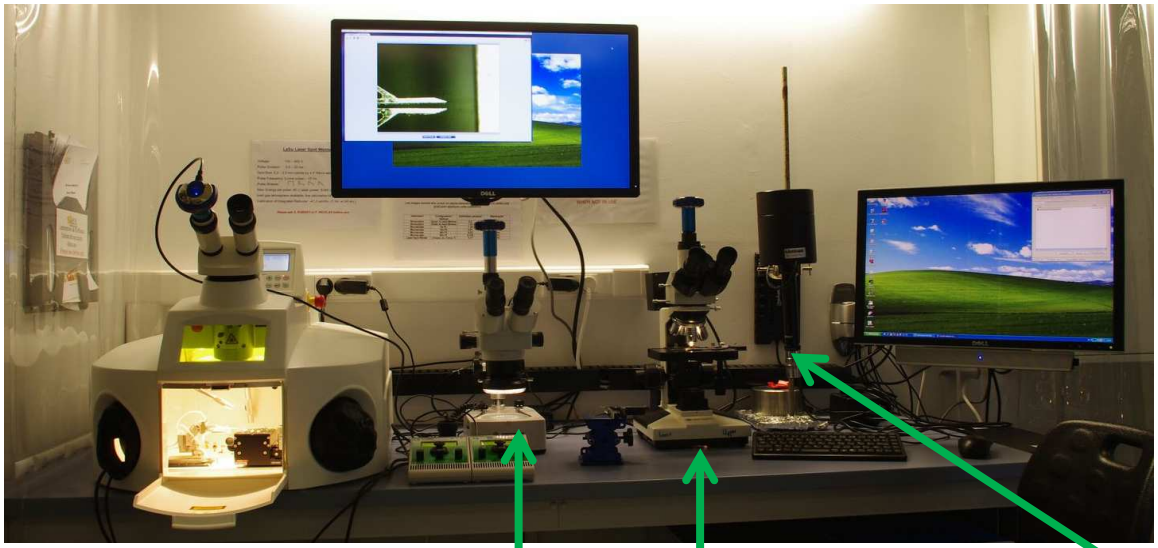
STM image, U = 2V, 0.2 nA, and particle size ditribution by courtesy of A. Naitabdi, UPMC, Paris.

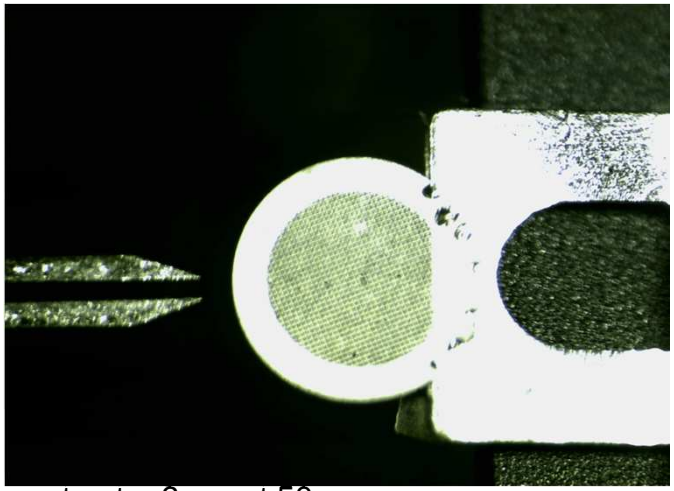
Preparation method: inverse-micelle encapsulation from diblock-copolymers.
Removal of polymeric groups: UV light under O_2 at atmospheric pressure in the UVCS chamber at LaSu, SOLEIL.

Exemple # 2 pour dispositif UHV-atmospérique

« **top-hat** »: extension CF60 pour chambre SAS du VTSTM Omicron standard. Méthode facile d'effectuer des procédés non-compatibles UHV sur un bâti standard. Le dispositif comprend un filament, un cache, et une arrivéé de gaz à vanne d'aiguille. Autres options sont possibles (p.e. lampe UV).

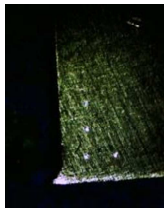
Microscopes et µ-manipulation au LaSu



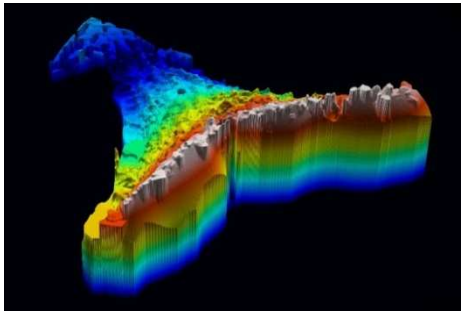


spot entre 2mm et 50µm

Binoculaire



µ-scope optique



µ-scope “PhaseView”, permet 3D sur qq. 10nm, résolution latérale ~1µm

Conclusions and Perspectives

- ✓ **The UVCS-chamber can serve as a practical device to assure process control and a better understanding of cleaning processes on the atomic scale:**

  UHV analysis – non UHV processing

- ✓ **An even simpler approach is the « top-hat » extension, compatible with OMICRON STMs**

- ✓ **There are new ways to manufacture or modify UHV-compatible instruments without necessarily needing a specialised workshop**

MERCI !