Surface Science Instrument (“Hot machine”)

The instrument consists of an analysis chamber (AK), a preparation chamber (PK) and a two stage sample introduction system (two small chambers, one pumped by a turbo pump (2nd stage) and one by a primary pump (first stage)). The sample is mounted on a sample rod for measurement and transfer. The sample is mounted at the outside, brought to the first stage (1 mbar) than after several minutes to the second stage (10-7 mbar). After 30 minutes it is introduced to the preparation chamber. During the study, it is moved between preparation and analysis chamber.

The preparation and analysis chambers and the sample introduction system are placed in a glove box for handling of radioactive (transuranium) samples.

**Preparation chamber:**

* Thin film deposition by sputter deposition (triode system, Ar pressure around 5 10-3mbar). Deposition can be done in presence of reactive gases to produce oxides (O2, gas), nitrides (N2 gas), hydrides (H2 gas)
* Thin film cleaning by sputtering (broad beam ion gun)
* Atomic oxygen exposure (O is produced by splitting O2 in an ECR plasma source)
* Water deposition (through a capillary directed to the surface). Water is contained in a tank and degassed prior to the experiments.

**Analysis chamber**

* Photoelectron Analyser (Leybold, EA10, single channel)
* X-ray source (non monochromated, 12 kV, 30 mA): AlK, and MgK radiation
* UV-source (SPECS) – windowless source producing HeI, HeII and HeII\* radiation
* RGA

**Sample Analysis and Transfer rod**

* The sample is fixed by four screws on an isolated (thermally and electrically) sample holder.
* The holder is cooled by LN2 (flowing through a small reservoir directly beneath the sample). Because of the tight fixing by screws, thermal contact with the sample is excellent. -200°C are easily and rapidly reached.
* The sample can be heated to 800°C by an resistive heater integrated into the sample holder.
* Cooling and counter heating can be done simultaneously. All temperatures between -200°C and 800°C can be reached.