

Processing

The clean rooms are suited for photolithography processes and are equipped with a variety of solvents, acids, resists, developers and removers. Separate work stations (hoods) which are divided into solvents or acids are available. In addition to conventional wet etch, plasma etching system is available for more precise and anisotropic etching. High vacuum evaporators are capable of deposition of a large variety of metals in order to create ohmic contacts, gates, contact pads, etc. Characterization instrument like optic microscope, profilometer and SEM are available for parallel monitoring of process steps.

Available equipment

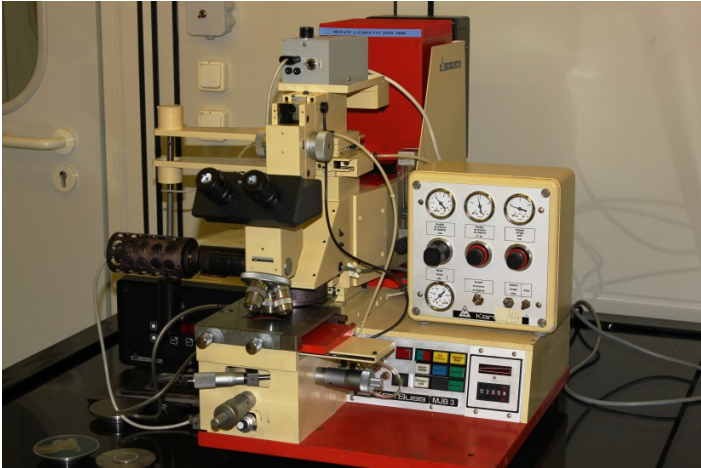
- a. E-gun evaporation system
- b. Thermal evaporator (Edwards)
- c. Reactive ion etching (RIE) system
- d. Plasma deposition system
- e. Rapid thermal annealing (RTP) system
- f. Scanning electron microscope (SEM)
- g. DEKTAK profile meter
- h. Scriber
- i. Bonder

The yellow rooms, for optical lithography, are equipped with spinners, hot plates, stirrers, mask aligners, solvent and acid hoods.

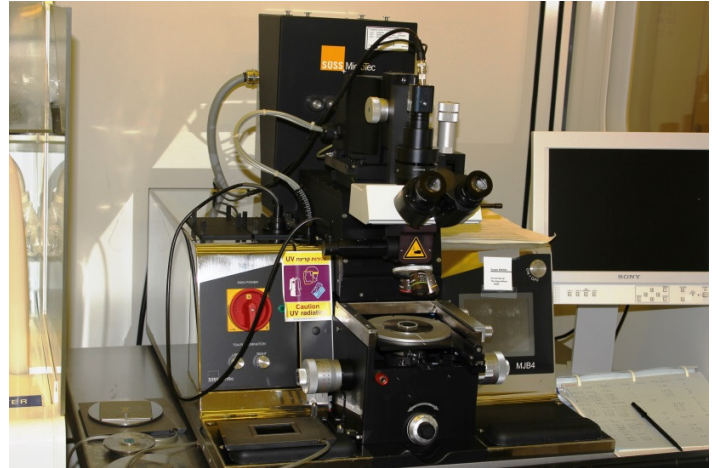
In our center, most of the photo lithography is based on positive resist S1805 and image reversal resist AZ 5214E, both resist are supplied by the center. If a user have any special demands for special resist (thickness, chemical properties) he can order the resist of interest and develop a desired process.

Mask Aligners

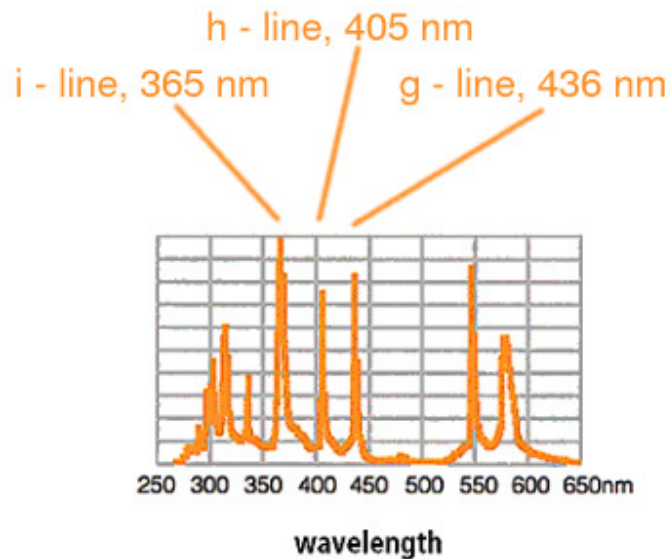
Mask aligner MJB3



Mask aligner MJB4



Mask aligners allow printing patterns on photoresists by transferring the pattern during illumination of resist with high intensity near UV light. The light source is a mercury (Hg) lamp (the spectrum available in picture below). In the mask aligner the i- h- and g- lines can be used for resist exposure. It is possible to get resolution down to $1\mu\text{m}$ and alignment accuracy less than $2\mu\text{m}$.



Typical mercury lamp spectrum (<http://www.nanophys.kth.se/nanophys/facilities/nfl/maskaligner/maskalign.html>).

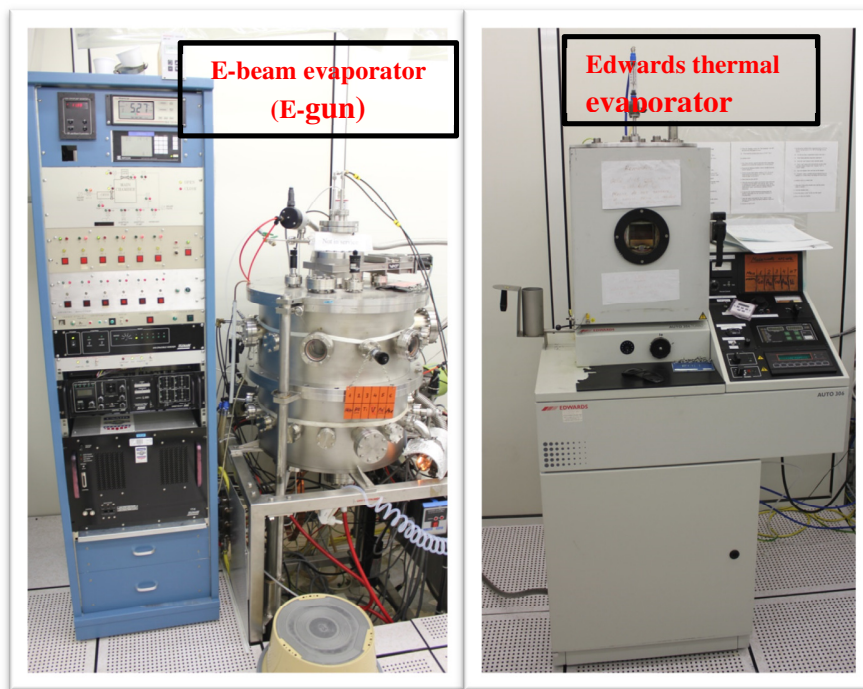
Plasma cleaning



Oxygen radio frequency (RF) plasma system.

Used for ashing/stripping/descum processes of the residual photoresist.

Evaporators



In thermal evaporation the materials which are needed to evaporate are placed on crucibles (made from refractory metal) and heated up to the boiling/sublimation temperature. In E-beam evaporation the heating of the desired material is obtained by targeting an accelerated (to several kV) electron beam to the surface of the material.

The Edwards system is more user friendly while E-gun system is capable of higher resolution patterning and deposition of high melting point materials.

RTP/RTA



Rapid Thermal Processing (RTP)/ Rapid Thermal Annealing (RTA) system

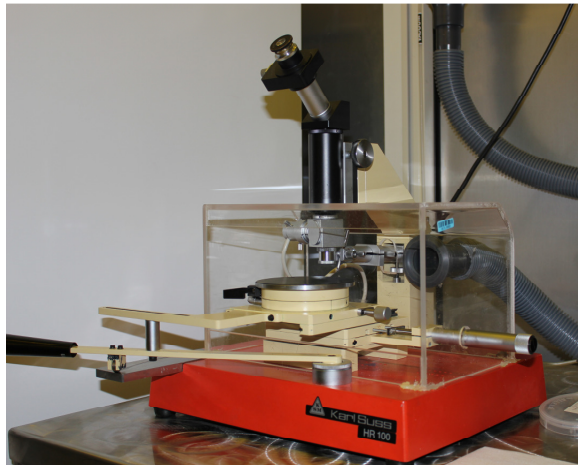
RTP provides a way to rapidly heat wafers to an elevated temperature in order to perform relatively short processes at high temperatures (up to 900°C), typically less than 1-2 minutes long. Main use of the system is alloying of ohmic contacts on GaAs samples. A strip RTP system is also available.

Plasma Etching



Reactive Ion Etching (RIE) is a plasma etching technic that uses reactive ions like F^{\cdot} or Cl^{\cdot} (halogens) produced by ionizing gases, to interact with exposed surfaces of samples that results in chemical etching. The main advantage of the RIE is anisotropic etching (unlike in wet etching). The main disadvantage is the complexity of the system and reactions that take place during etching.

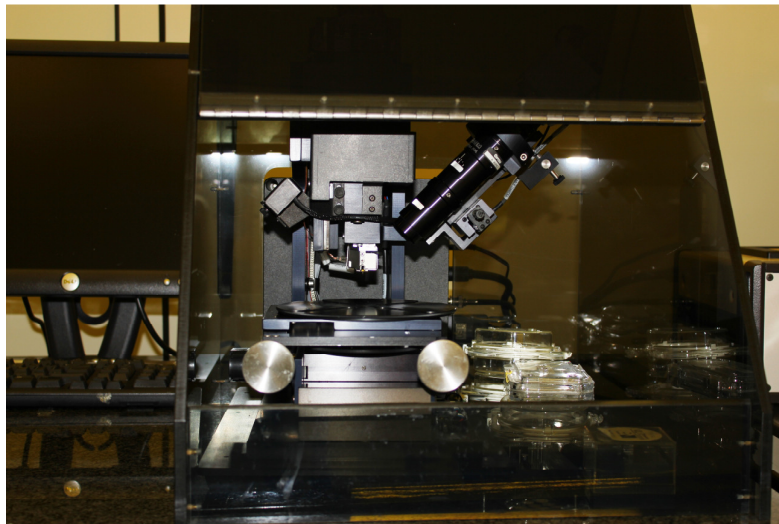
Scriber



The scriber is applied for precision cutting of wafers.

Characterization technics

Dektak profilometer

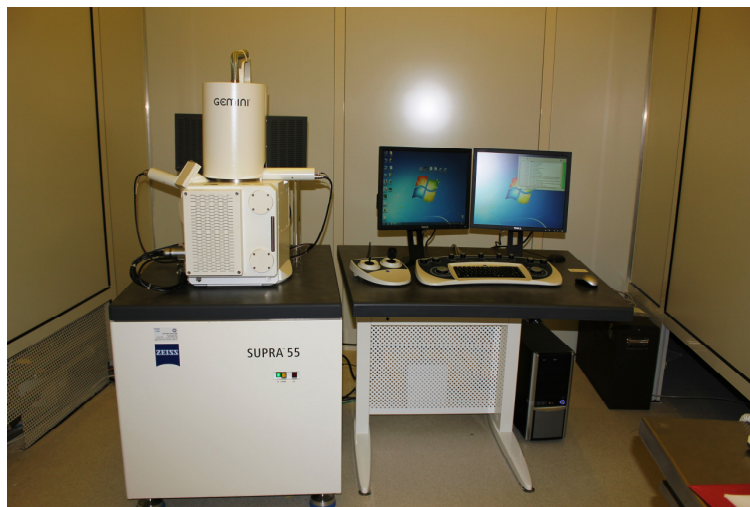


The surface profilometer allows to measure thin films thicknesses down to 100Å resolution (below 100Å measurement is hard due to surface roughness of the wafers), as well as thick-film measurements up to several hundred microns thickness (very useful for photo/E-beam resists thickness verification).

Optic microscope



Scanning electron microscope SEM



SEM provides images down to nanometer scale. The SEM is a very useful instrument for sample characterization and fabrication analysis.