NEON (Neutral Acceleration)

Objectives

It is possible to modify the speed and trajectory of the NPs during their travel along it, and/or make them interact with injected gasses. Modifying the speed and trajectory of the NPs is performed using charged particle optics. The intrinsically charged particles (in metals, most of them negatively charged) can be filtered using deflection plates, diverting the charged nanoparticles horizontally out of the beam. To ionize the remaining neutrals NPs we use a home-built axial grid electron source, allowing for incident electron energies ranging from 20eV to 300eV. In this range of electron energies ionization is mainly due to electron knock-off, leading to a beam of positively charged nanoparticles.

Environmental conditions

- Charged NPs and post-ionized clusters can be accelerated using a pulsed extraction. Acceleration voltages up to 6 kV with both polarities. After the acceleration, the charged particles pass through an Einzel lens and steering optics. In order to investigate the influence of charge on the reactivity of accelerated nanoparticles, further neutralization of positively charged NPs can be performed with a low energy electron source (0 – 10eV and 0 – 500 eV). A second set of electrostatic deflection plates are installed after the electron source so as to remove any remaining charged NPs from the beam if required or to quantify the fraction of NPs that have been ionized. Just before the exit of the acceleration module, a Faraday cup and a QCM are installed to help monitoring all processing in the chamber.
- The Acceleration module is pumped by a Turbo 700 l/s supported by a rough pump type scroll 15 m^3/h. Pressures are measured by full range gauge type Pirani-Penning.

Analytical Techniques

- **Faraday cup** for measurements the ions deflected.
- **QCM** is mounted on a z-translator perpendicular to the beam that permits the monitoring of NP.