

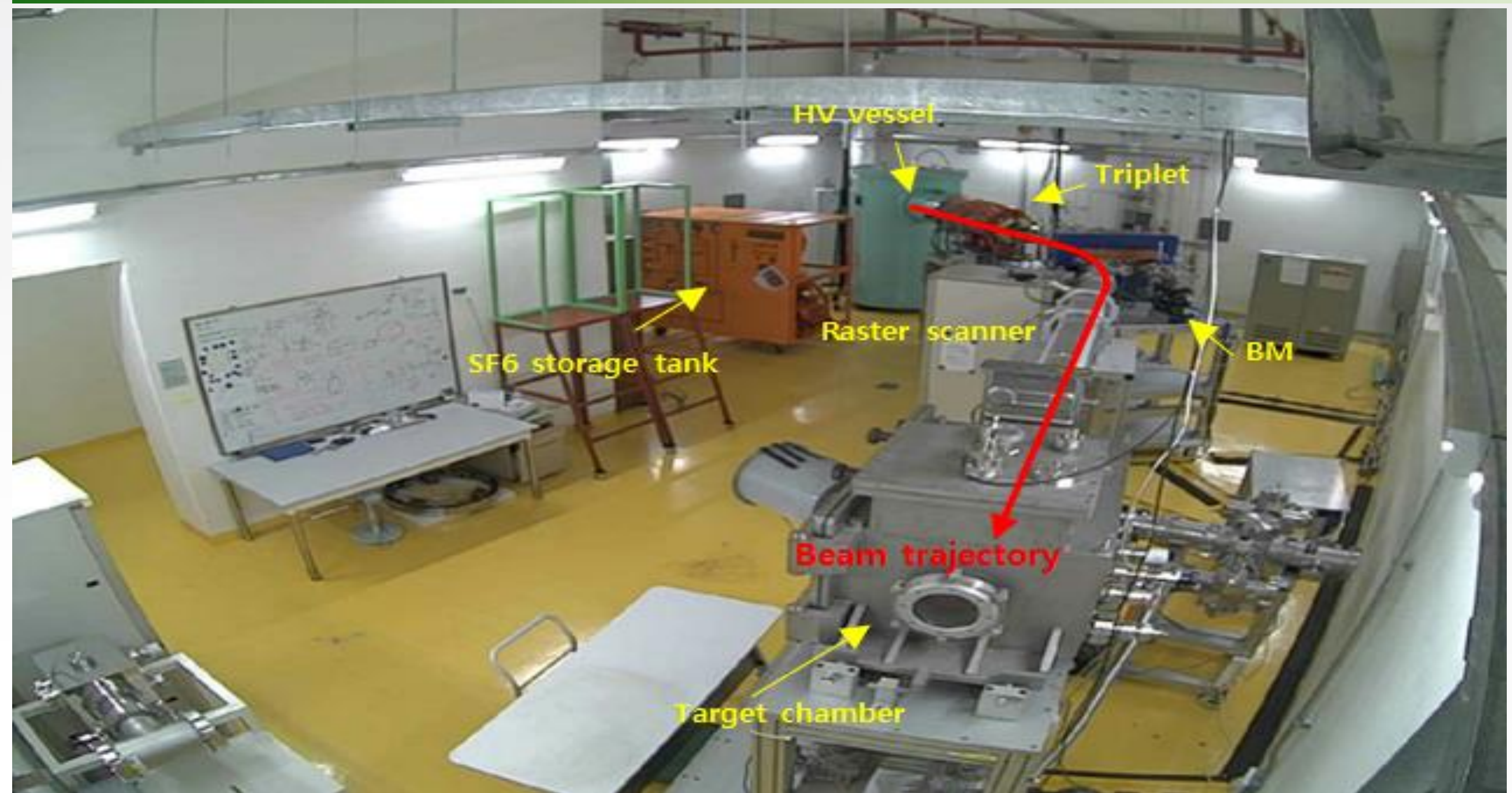
Development of 6-inch wafer loading system for 1-MV electrostatic accelerator at KOMAC

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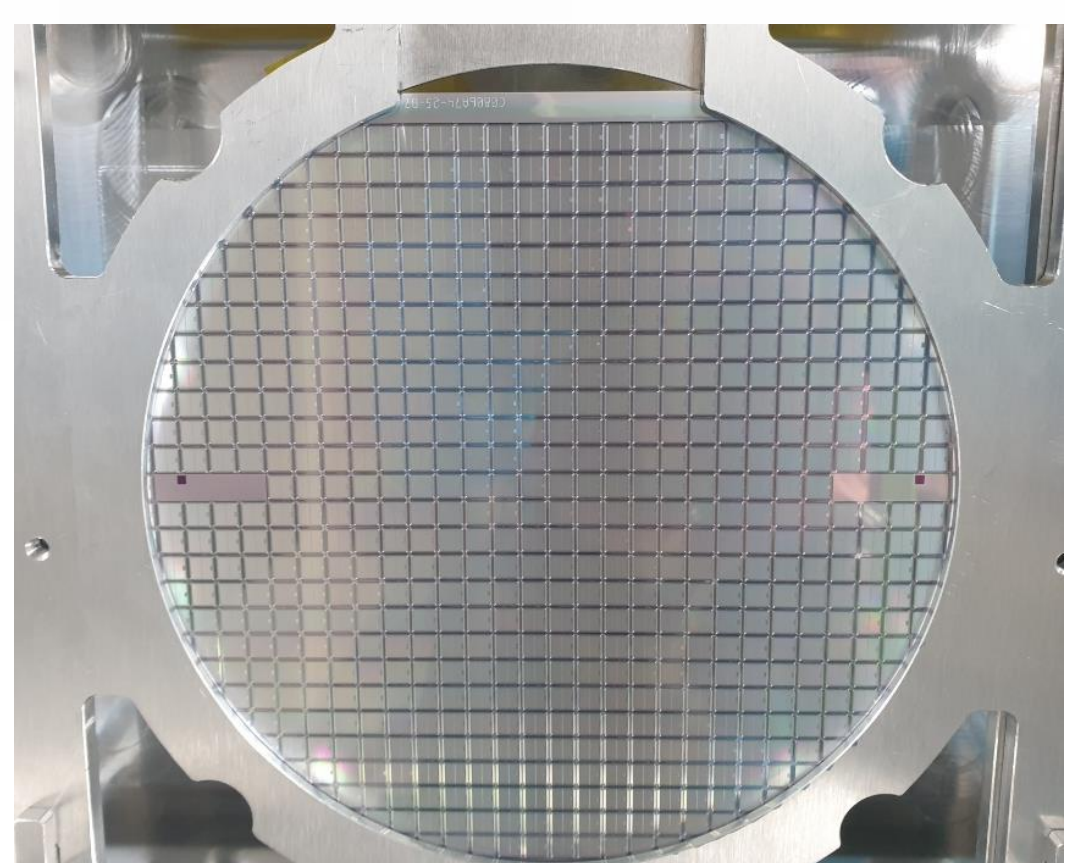
Accelerator Specifications

- Beam current max : 1 mA
- Accelerating voltage : 0.2-1.0 MV
- HV power supply : ELV Type
- Insulation : pressurized SF₆
- Ions : H₂, O, N etc
- Ion source : 200 MHz compact RF Ion source
- Beam line : Quadrupole triplet+ Dipole magnet +Raster scanner

Layout



Industrial power semiconductor

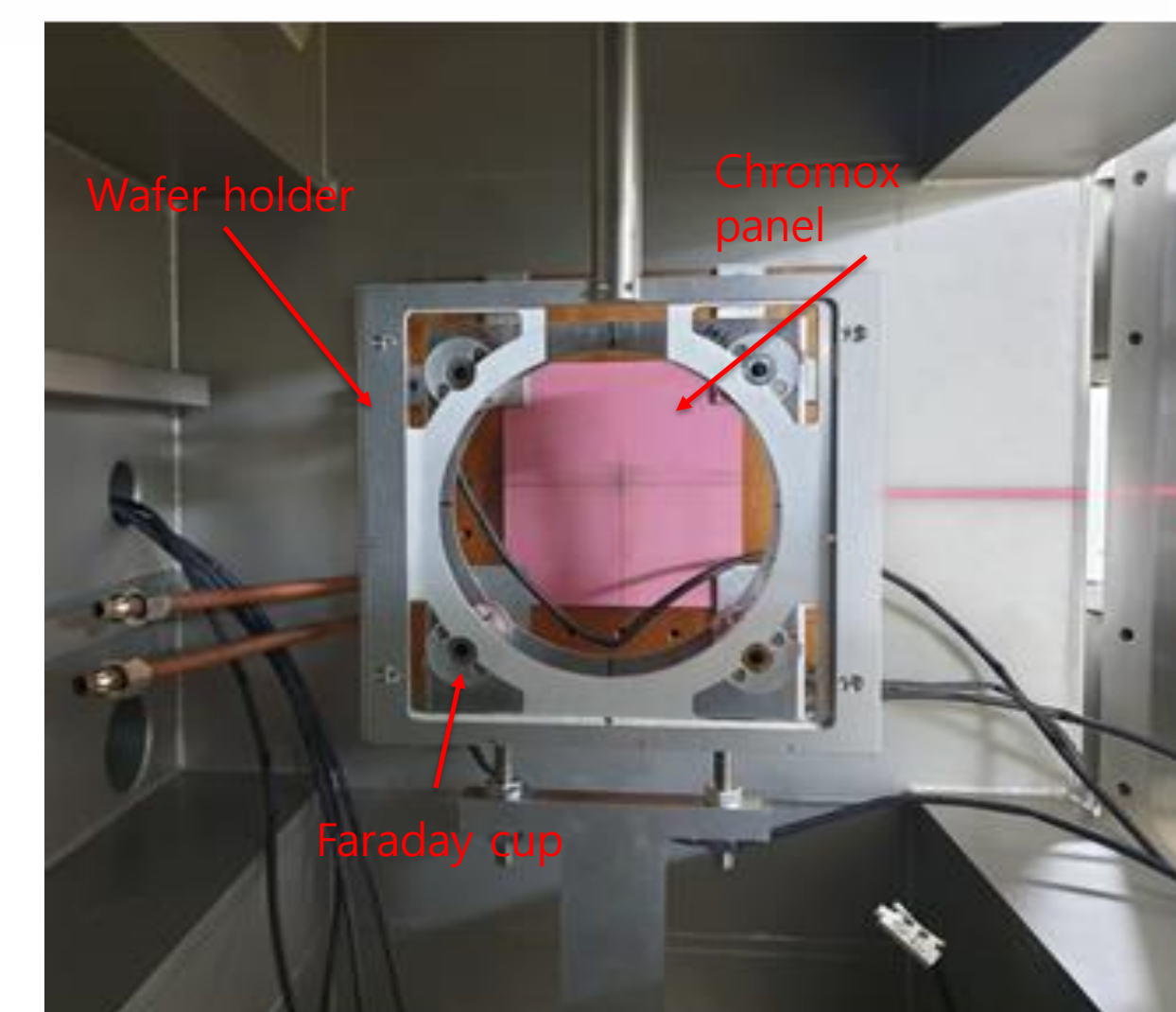


- Ion species : Proton
- Energy range : 0.5~1MeV
- Maximum beam current : <100 uA
- Dose range : ~5E15[p/cm²]
- Irradiation Diameter : >150 mm

Wafer holding system

● Wafer holding components

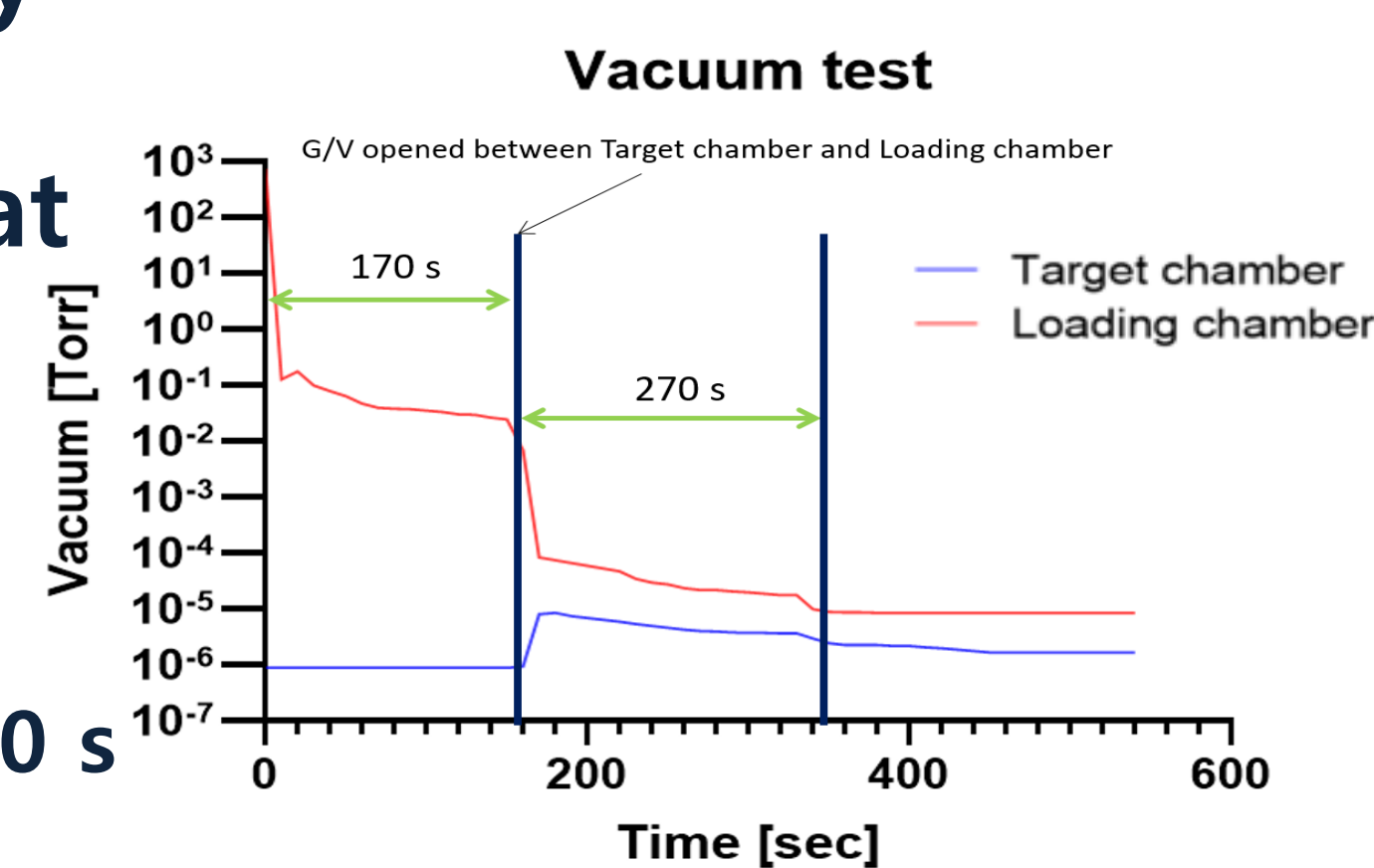
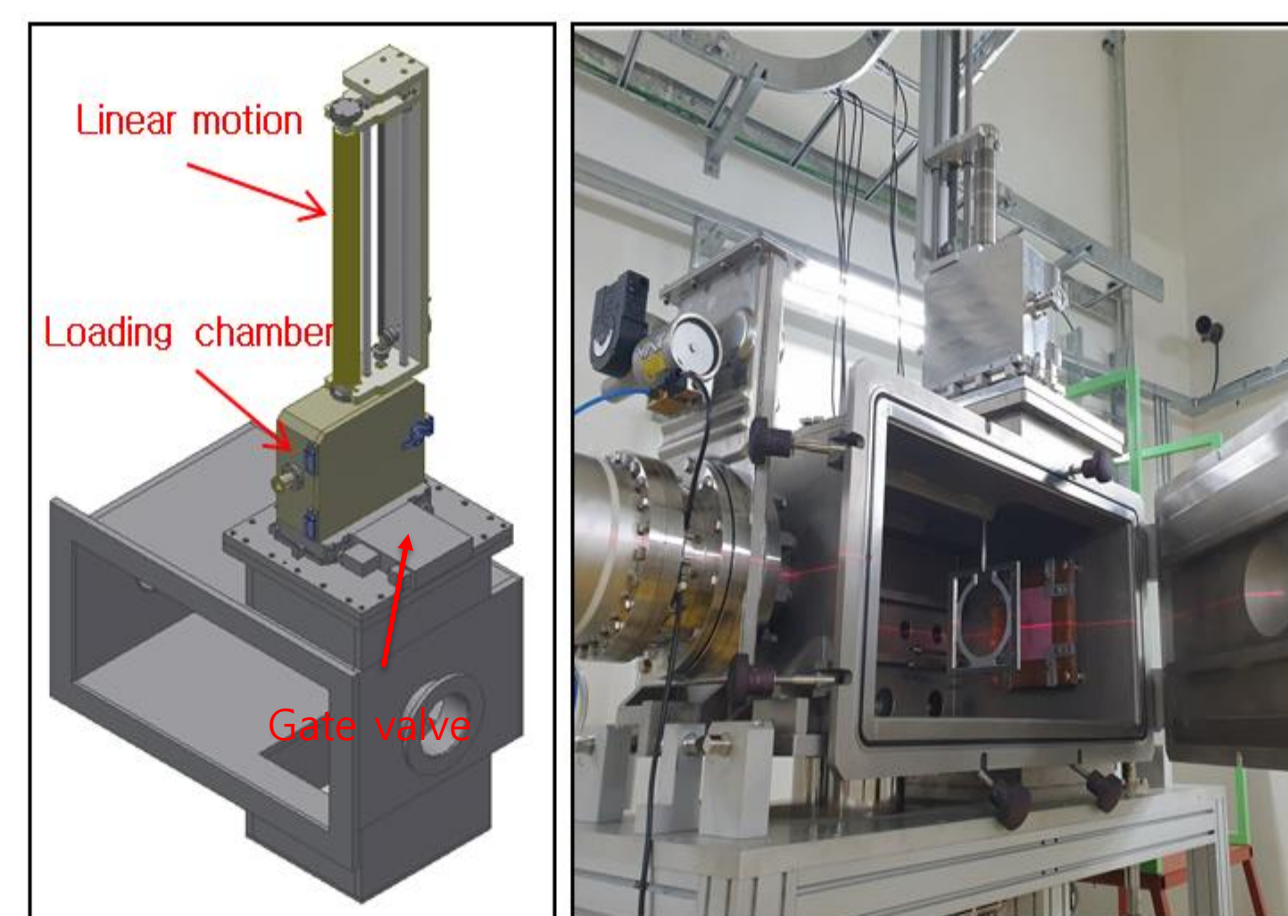
- 6" wafer holder
- 4 small faraday cups for the beam uniformity measurement
- Chromox panel with a camera to measure beam profile



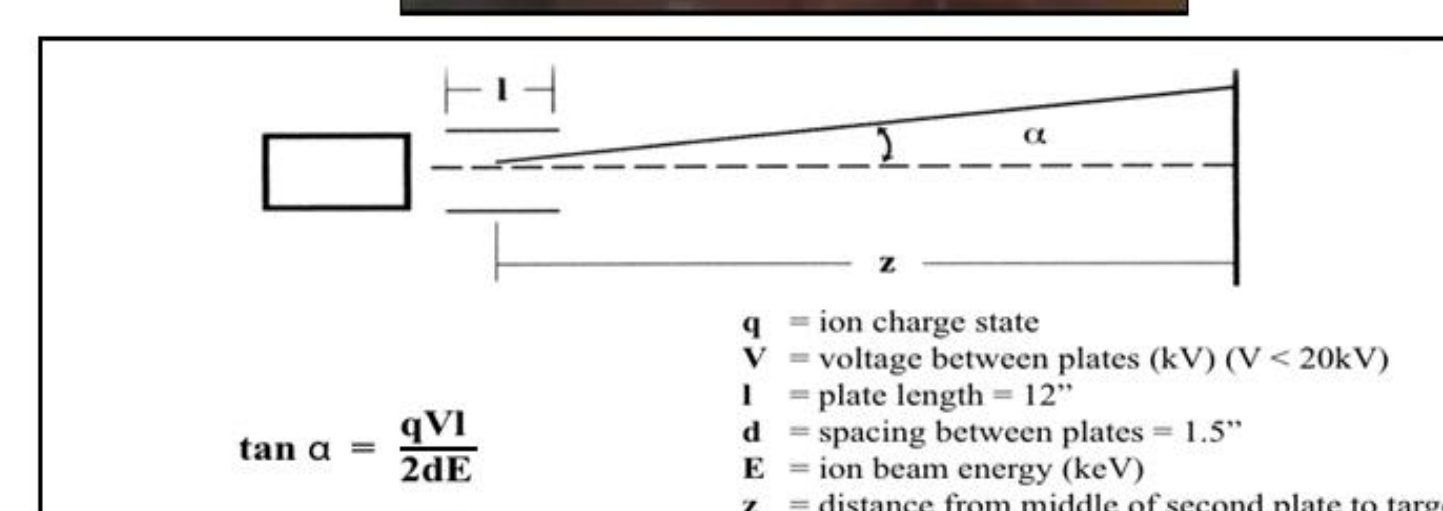
Loading chamber system

● Wafer loading system

- Linear motion for vertical transfer
 - Travel distance : 600 mm
- Loading chamber to install wafer
 - Volume of loading chamber : 0.0075 m³
- Gate valve for vacuum boundary
- Vacuum pump for low vacuum at loading chamber
 - Operation vacuum : <5E-6 torr
 - time to reach operation vacuum : <400 s



Beam scanning



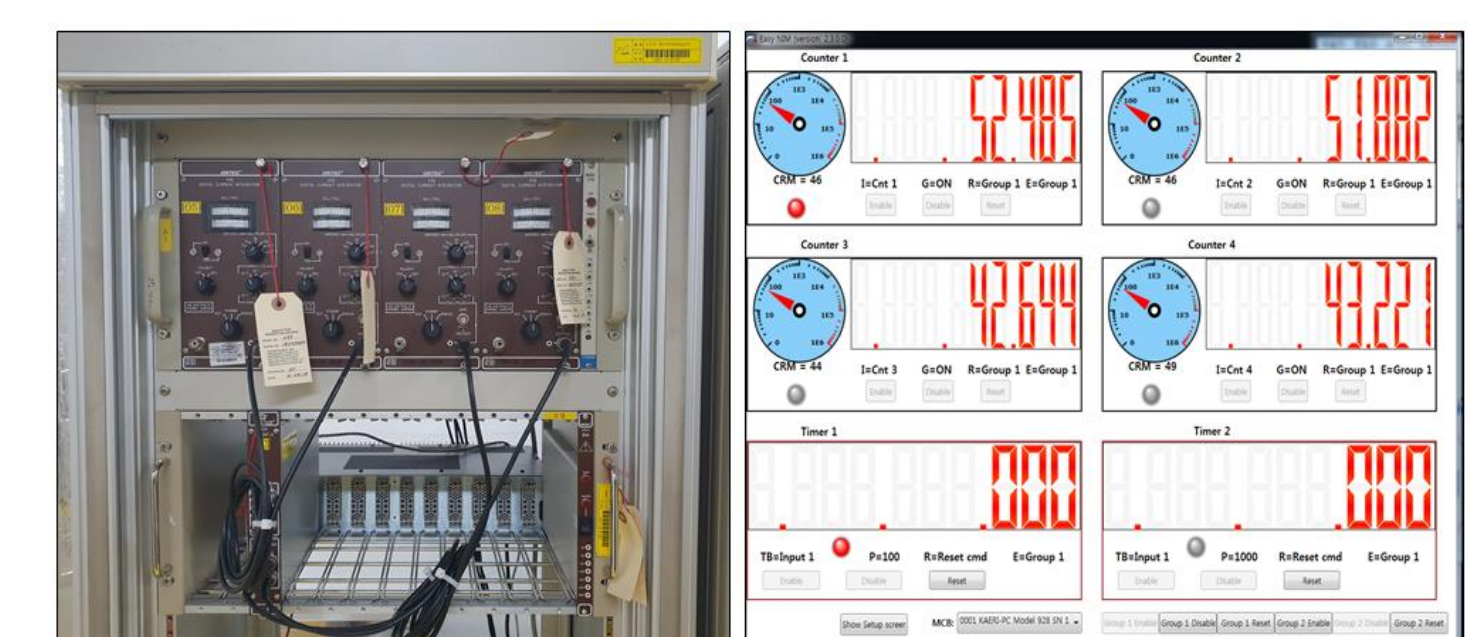
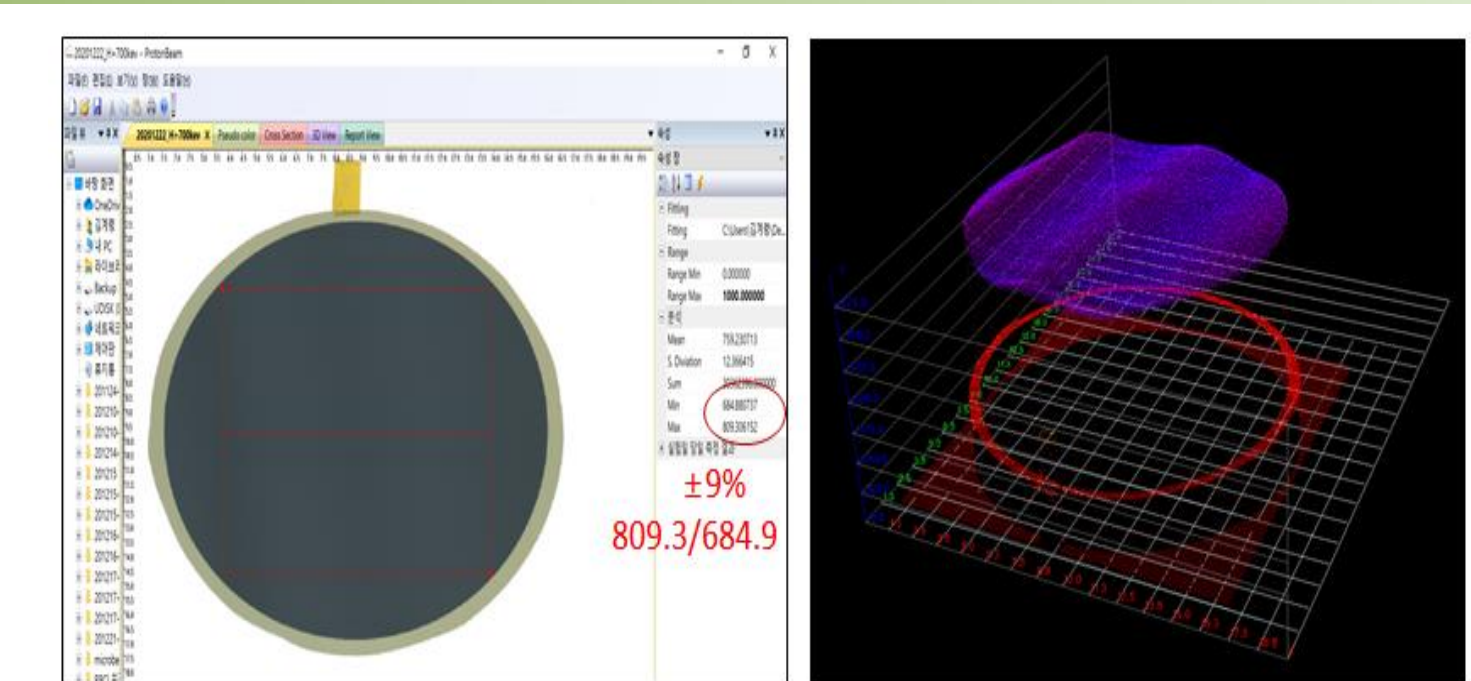
● Expansion of Beam Irradiation Area for power semiconductors

- Raster scanner for scanning beam
 - Frequency vertical : 64 Hz
 - Horizontal : 517 Hz
- Set input voltage : <10 kV
- Irradiation Diameter : >150 mm

Scanning beam uniformity measurement

● Beam measurement components

- Gafchromic film for uniformity measurement
 - Beam uniformity : <10 %
- 4 channel Current integrator
 - Real-time and integral value can be measured using current integrator.



Status and Future Plan

- By installing the loading chamber on the top of the irradiation chamber, the 6" wafer replacement time has been reduced to 1/10.
- Automatic loading system with increased the chamber capacity will be developed for large scale treatment.
- Through this system, we are going to provide beam service for potential end users that can use this system industrially.