

# ION IRRADIATION AND IMPLANTATION FACILITY

The compact D.I.S Germany Ion Irradiation and Implantation Facility is based on a versatile Electron Cyclotron Resonance Ion Source (ECRIS) which is offered in two basic versions for the charge and mass separation of the extracted ion beam.

The product is aimed to users in research and development, but also for industrial applications, providing ion irradiation and implantation in samples of up to 200mm in size.



*further reading and related products:  
Electron Cyclotron Resonance Ion Source  
Wien filter*

*Configurable Ion Irradiation and Implantation Facility for ion beams of up to emA and sample sizes of up to 200 mm.*

### Special Features:

- two basic versions for charge and mass separation of the extracted ion beam:
  - ECRIS with a compact Wien filter for low to intermediate ion beam currents and
  - ECRIS with a magnetic dipole for ion beam currents up to emA.
- facility is offered in different versions with different ion beam guiding systems:
  - horizontal beam guiding,
  - vertical bottom-top beam guiding and
  - vertical top-bottom beam guiding.

### Optional Supplementing Devices:

- alternative ion source configurations with Electron Beam Ion Sources (EBIS) for highly charged ions or Field Ionisation Sources (FIS) for complex molecules,
- generation of metal ion beams over a wide range of elements using the MIVOC method (MIVOC: Metal Ions from Volatile Compounds),
- gas mixing board for different process gases.

## ION IRRADIATION AND IMPLANTATION FACILITY

### BASIC CONFIGURATION

The ion irradiation and implantation facility includes an ion beam source with RF and gas feeding systems, ion beam optics, a charge state & mass separator (magnetic dipole or Wien filter), an irradiation chamber with substrate manipulator stage (heatable up to 500°C and devices for linear target motion, for the adjustment of the target tilting angle and for target rotation) for substrates up to a size of 200mm, vacuum system, high voltage power supplies, PLC-based command & control (C&C) unit and full documentation.

#### Ion Source

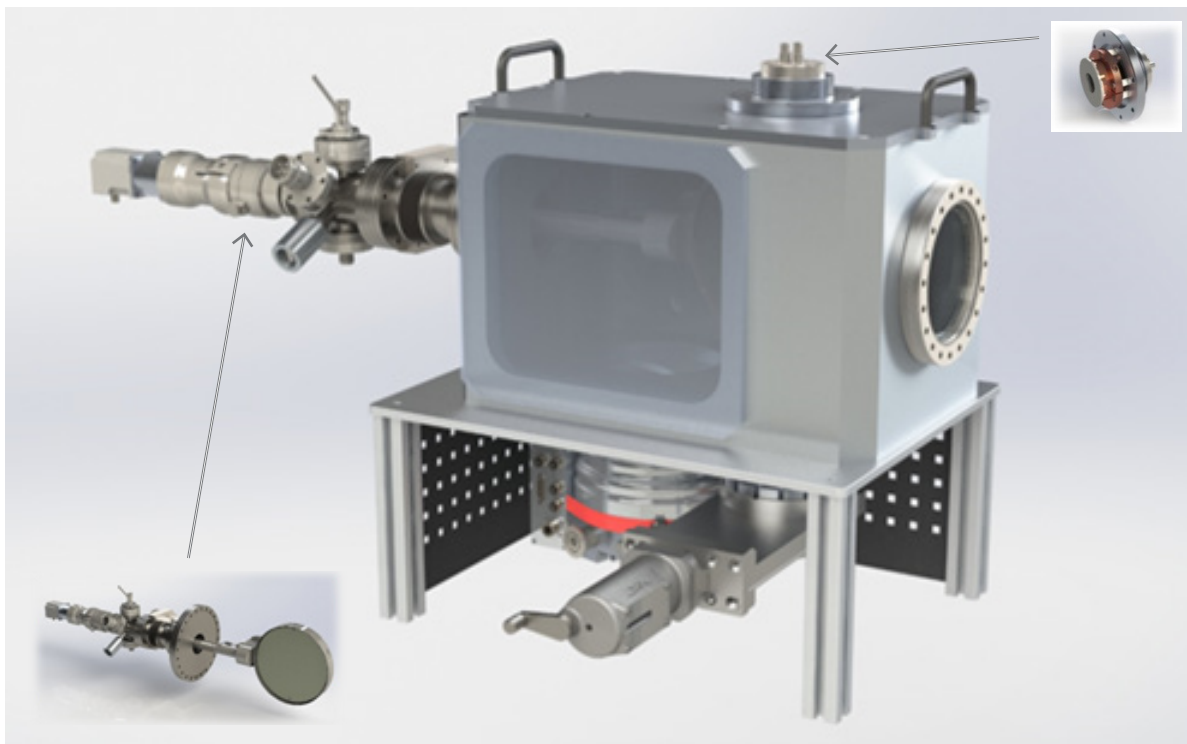
The used ion source is an Electron Cyclotron Resonance Ion Source (ECRIS) capable of producing ion beams of hundreds of  $\mu\text{A}$ , in some configurations up to  $\text{mA}$ . Any gas can be fed into the ion source, special techniques can also be used to inject metallic ions and complex organic molecules.

#### Beam Guiding System

In order to purify the ion beam according to the ion charge state and ion mass, and in dependence on the required ion beam current a magnetic dipole (high ion current applications) or a compact Wien filter (low or intermediate ion beam current applications) is mounted downstream of the extraction system.

### ION IRRADIATION CHAMBER

The ion irradiation chamber (see figure below) includes a high-power Faraday cup and a manipulator stage suitable for heating (up to 500°C or higher on customer demand) and rotation of the substrates. The manipulator stage is installed on a linear and rotary feedthrough for linear translation as well as for realizing different ion implantation angles.

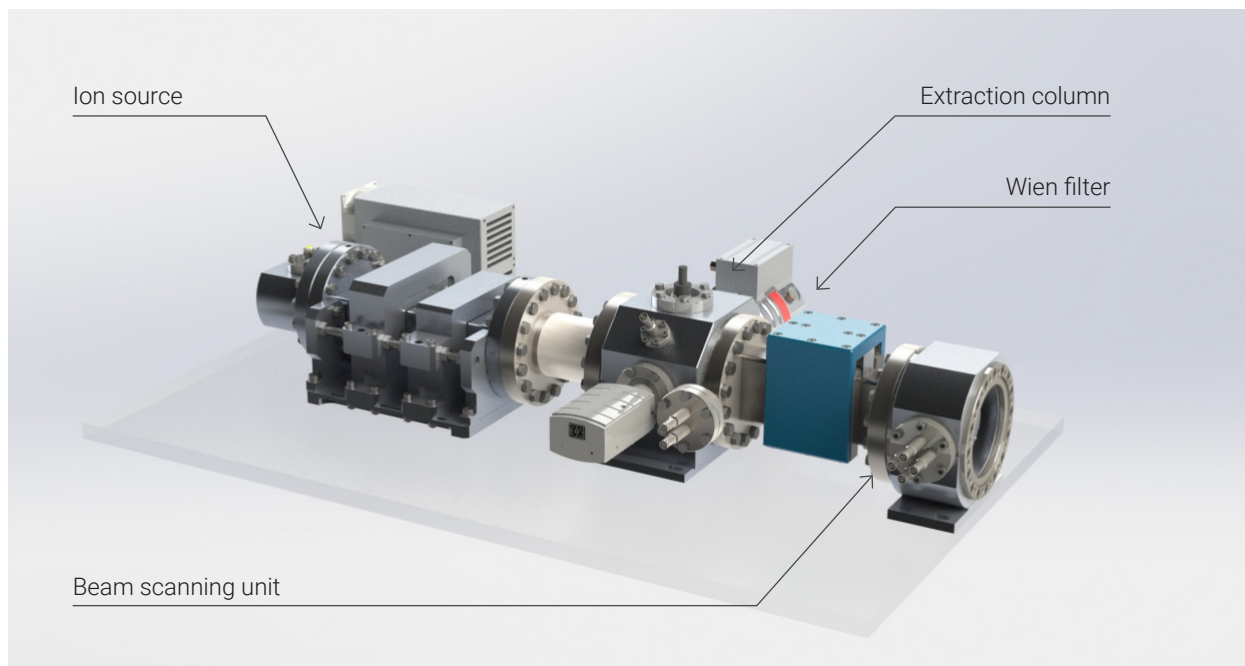


Configurable irradiation chamber with high power Faraday cup (top right corner), manipulator stage (bottom left corner), gate valve, turbo pump and preparation for sample handler.

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D.I.S Ion irradiation and implantation facility with magnetic dipole and irradiation chamber configuration. Some components of the HV shielding are hidden for more details.



D.I.S ECRIS with extraction column in a configuration with Wien filter and electrostatic beam scanning unit (approx. length 1m).

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## TECHNICAL DATA

produced ions	protons (H <sup>+</sup> ), helium (He <sup>+</sup> ) up to heavier elements (for example Ne <sup>+</sup> , Ar <sup>+</sup> ), injection methods for metallic ions offered on request
energy range	from 1 keV to 30 keV
ion beam current	hundreds of eμA up to eA
charge state & mass filter	magnetic dipole for high ion beam current applications, Wien filter for low up to intermediate ion beam currents
beam guiding system	electrostatic beam optics with appropriate HV power supplies
beam scan	mechanical or electrostatic ion beam scanning for sample areas of up to 200mm
vacuum	base pressure down to ~10 <sup>-8</sup> mbar, working pressure ~10 <sup>-6</sup> mbar and higher
software	Programmable Logic Controller (PLC) and graphical Human Machine Interface, full control of ion source and beam parameters, optional, full control of the parameters of the irradiation chamber
irradiation chamber	irradiation chamber for up to 200mm sample size, variable implantation angle, heating up to 500°C and higher (on customer demand), measurement of the beam current, software control of the applied ion current, target transfer system on request
approx. box size (length x width x height)	2 m x 2 m x 1 m

## CUSTOMIZATION

The facility has a modular design and can be offered as a complete ion irradiation solution, as well as individual components of the system can be ordered.

Please do not hesitate to contact us to find a solution suitable for your special application.