CUSTOM MADE CHAMBER

scientaomicron

Magnetically Shielded UHV Chambers

Quality chamber design is crucial when you need to build your experimental setup from the ground up with individual components and an established system solution is not of interest. The chamber centrally links all of the components together while providing UHV conditions and excellent magnetic shielding.

Scienta Omicron has a long tradition in UHV chamber design with numerous operational chambers in the 10^{-11} mbar range. Many of these are used in ARPES setups with accordingly high requirements on magnetic shielding. The configurable chamber combines years of experience in ensuring magnetic shielding and guaranteeing analyser performance, while allowing easy adjustment of ports to fit your envisioned setup.

Chamber Body & Shielding

The chamber body is made from stainless steel with an outer diameter of 306 mm. The bell shaped top allows for multiple ports pointing at the sample position in front of the analyser. In addition, port lengths can be kept shorter which is beneficial for the field of view. The 300CF bottom flange is equipped with mounting brackets for mechanical integration into the setup and comes with a zero length reducer.

The magnetic shielding is provided by inner mu-metal liners, either single or double depending on the requirements on the residual magnetic fields. For low kinetic energies and best energy and angular resolutions in ARPES, we recommend double liners. However, for XPS and HAXPES applications single liners are typically sufficient.

A high quality mu-metal connection interface between chamber and analyser magnetic shielding is critical to ensure no fields leak into the chamber at the interface. Our chamber shielding design ensures optimal magnetic shielding for the analyser.

Chamber for an ARPES setup with UV laser source. It is based on the configurable chamber with ports configured to individual customer requirement. The double mu-metal liner provides best magnetic shielding for ARPES measurements at low kinetic energies and highest energy resolutions. The setup is completed by the research group with components for sample handling, light source, analyser, and vacuum system.

- Start with functional chamber design example.
- Configure to own experimental requirements.
- Expert advice and guidelines for magnetic shielding.
- Port placement and residual magnetic fields inspection.
- Guaranteed analyser performance.

Design Process

The starting point of the design process typically is a standard chamber which is itself suitable for photoemission spectroscopy as is. It includes ports for analyser, manipulator, light sources, view ports and pumps. The initial model is available as a 3D step file and a technical drawing.

The chamber port geometry is described by the port list specifying the focal point, length, and angles for each port. This list is easily tailored to the specific setup requirements and reviewed with our experts. Accordingly, updated 3D models of the customised chamber are quickly made available to check compatibility with the planned setup and all its components and available lab space.

Expert Advice & Quality Assurance

From the start, the chamber design is assessed by our experts and where necessary advice for improved magnetic shielding performance is given. This depends on the size, length, and total number of ports, as well as available shielding choices given the setups requirements. Our expert design of the mu-metal liner finalises the chamber and is optimised for effective magnetic shielding, optimal coupling between analyser and chamber mu-metals guaranteeing best conditions for analyser performance.

All chamber drawings are counter checked by a second engineer before release to production. Post production, a 3D CMM inspection of all ports confirms accurate port lengths and angles to ensure attached components are focused on the correct positions according to the setup requirements. A chamber leak check before delivery ensures UHV compatibility. Following demagnetisation, the residual magnetic fields are measured and confirmed to be below the guaranteed values.

Technical Data

Custom made chamber

Body	AISI 316 L (stainless steel)
Flanges	AISI 304 L (standard flanges)
Shape	Bell shaped
Outer diameter	306 mm
Max. height	700 mm
Finish	Brushed (or electropolished)
Leak rate	< 3 x 10^{-10} mbar * L/s
Bakeout temp.	< 200 °C (*)

* The bakeout temperature is generally limited by other components attached to the chamber.

Residual magnetic fields

Single liner	< 0.5 µT
Double liner	< 0.1 µT

Suitable analyser types

DA30-L, DA20, EW4000, HiPP-2, HiPP-3, and R3000.

The ARTOF-2 analyser requires a larger outer diameter chamber. Designs with either 350 mm or 400 mm are available.

Bespoke chambers

Other chamber shapes, materials, and designs are possible and require an initial design for technical assessment and clarification.

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