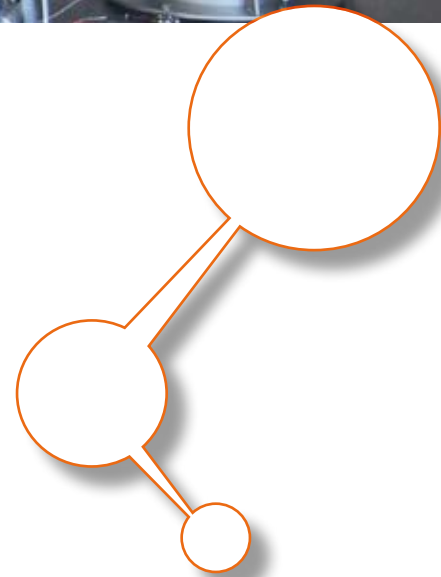
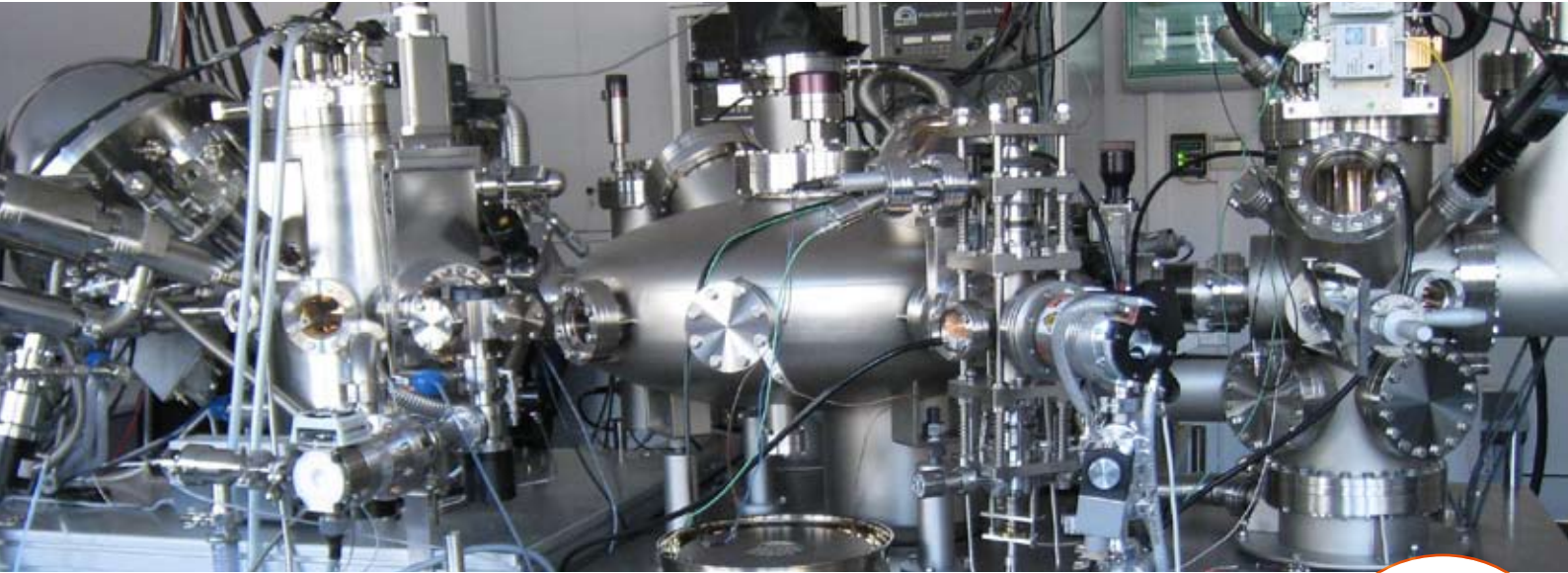


Deposition & Surface Analysis

Multi-Technique Systems & Modules



Henniker Scientific & Prevac



Prevac design and manufacture instruments & systems for thin film deposition and UHV surface analysis of both the physical & chemical properties of materials and interfaces. Formed in 1996 by Dr. Andreas Glenz, manager of the former Leybold Surface Analysis Division, Prevac now employ more than 120 talented technical and scientific staff in a custom built manufacturing facility 70km from Katowice.

With hundreds of custom installations in some of the world's most prestigious research groups, Prevac are rapidly establishing themselves throughout Europe, Asia and the Americas as a premier supplier of multi-technique deposition & surface analysis systems, instruments and components.

Prevac systems can be integrated with, and custom built around, the industry's leading analysers from Scienta, PHI and Kratos. All of the associated vacuum & UHV fabrication, sample preparation and handling, instrumentation, electronics and software is designed and fabricated in-house. This means that you receive direct manufacturer support whilst benefitting from significantly lower prices when compared with third party system integrators.

Solutions can be complete turnkey systems or else modules comprising any combination of sample preparation/transfer and handling to match existing analysers.

Prevac's quality procedures are recognised by full TÜV certification and they are proud recipients of Quality International's ISO9000 award, for the past 3 years in a row.

Henniker Scientific was formed in 2009 to represent leading instrument & system manufacturers. We are exclusive distributors of Prevac's full product range in the UK and Ireland.

As well as vacuum, thin film deposition and UHV surface techniques, our product portfolio, which reflects our technical experience of more than 15 years, includes quadrupole mass spectrometry, gas analysis, plasma cleaning/surface modification and also plasma diagnostic techniques.



Capabilities



Overview

We offer custom fabricated deposition & analysis systems, designed and manufactured to your exact requirements. These can be simple, single-chamber systems to complex multi-chamber computer-controlled systems for XPS, UPS, SPM, LEED, MBE and many other applications. Our systems can be equipped with a variety of deposition techniques, with ion sources for sample cleaning, with electron beam evaporators, thermal evaporators, and many more, all of which are manufactured by us.

Whether your process requires HV or UHV pressures, we deliver from OLED/PLD and device fabrication systems through to industrial box coaters and space simulation systems.



Example Research Systems



Catalysis

Preparation Chambers

- ▶ ion source
- ▶ mass spectrometer
- ▶ e-beam evaporator
- ▶ gas doser
- ▶ multiple spare ports
- ▶ independently bakeable

High Pressure Reactor

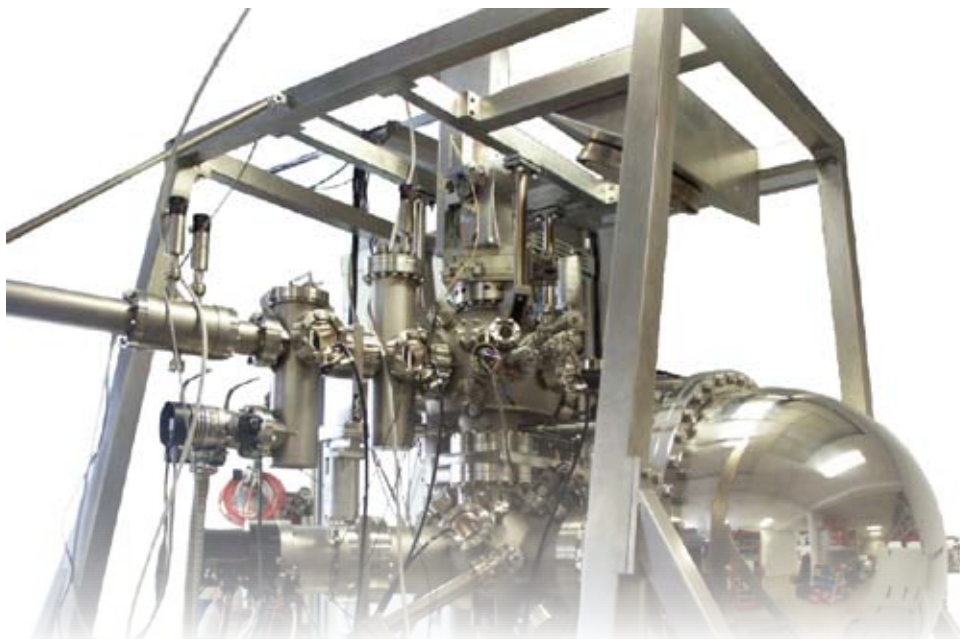
- ▶ 20bar
- ▶ heating to 650°C
- ▶ controlled atmosphere

Mu-Metal Analytical Chamber

- ▶ $<5E-11$ mbar base pressure
- ▶ monochromatic-XPS
- ▶ UPS
- ▶ 40 nm resolution PEEM
- ▶ 5-axis UHV manipulator
- ▶ 2-rotational axes motorised for angular mapping
- ▶ sample holder temp range -180 to 1000°C

Ancillary

- ▶ 6 specimen sample park chamber
- ▶ load lock chamber
- ▶ UHV linear transfer at $<1E-9$ mbar
- ▶ pumping by combination of maglev turbos, ion pumps, Ti sublimation pumps



Example Research Systems



Preparation & Investigation of OLEDs

Preparation Chamber

- ▶ detachable glove box
- ▶ ion source
- ▶ mass spectrometer (TDS)
- ▶ e-beam evapourator
- ▶ knudsen cells
- ▶ multiple spare ports

Mu-Metal Analytical Chamber

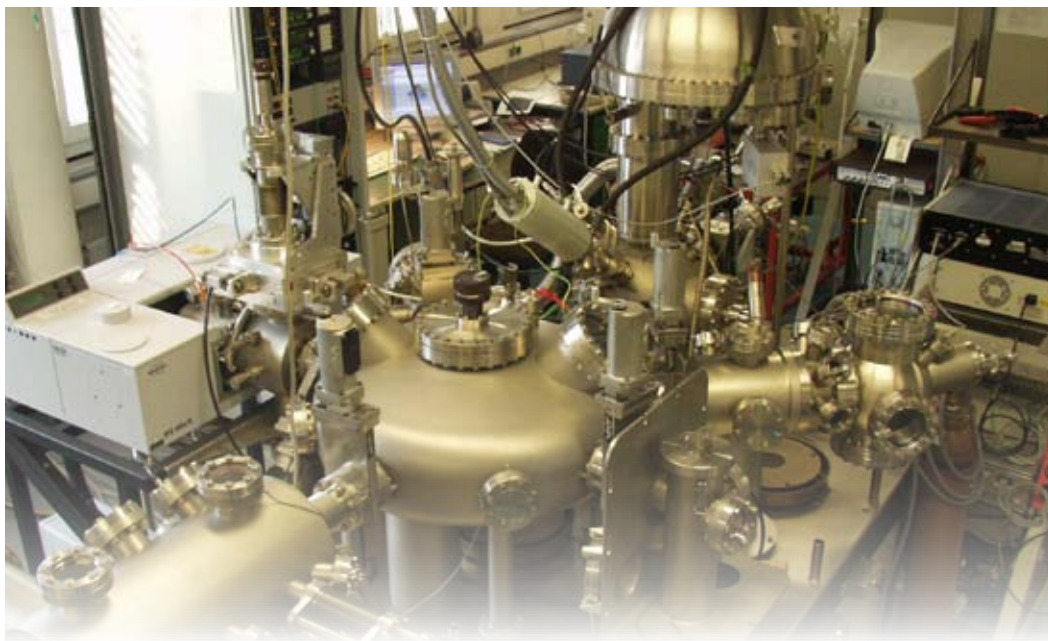
- ▶ $<1\text{E}-10$ mbar base pressure
- ▶ XPS
- ▶ IPES
- ▶ UPS
- ▶ EELS
- ▶ 4-axis high stability & reproducibility manipulator
- ▶ sample holder temp range -180 to 1000°C

Variable Temp. STM/AFM Chamber

- ▶ accessible via reorientation chamber
- ▶ custom sample holder carries STM holder & allows heating/cooling and temperature measurement in all other chambers

FT-IR Chamber

- ▶ commercial FT-IR can also be used standalone
- ▶ sample heating/cooling during analysis
- ▶ in-situ e-beam evapourator



Example Research Systems



Nuclear Resonance Scattering of Magnetic Multilayers

Preparation Chamber

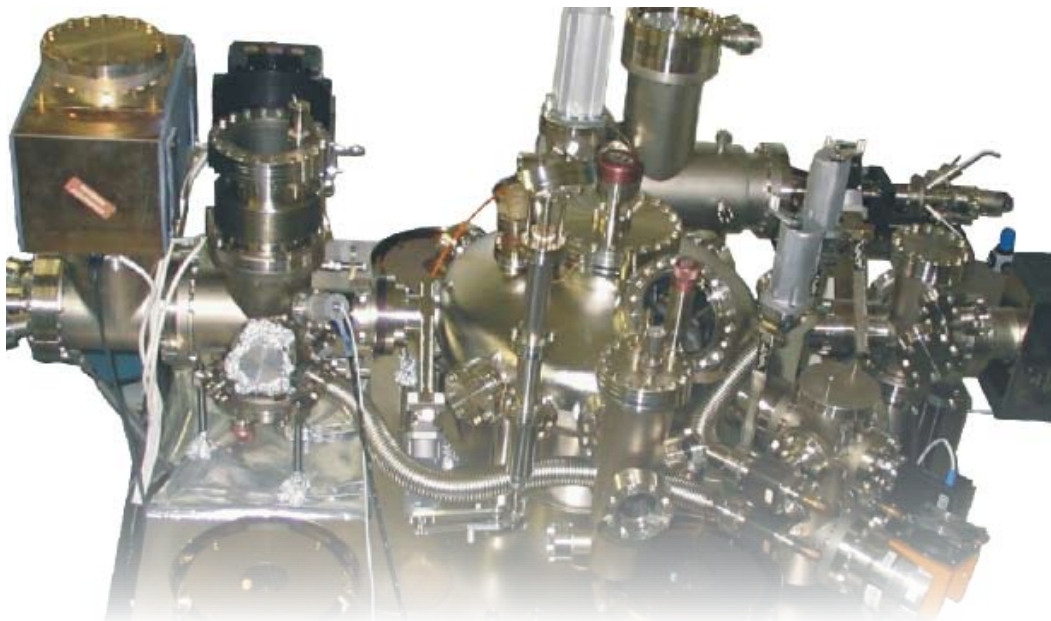
- ▶ ultra-thin film deposition
- ▶ multilayer deposition
- ▶ 2 x molecular beam evaporators
- ▶ LEED/AES for control of layer structure and composition

Nuclear Resonance Scattering Chamber

- ▶ 2 circle diffractometer chamber mounting
- ▶ grazing incidence scattering between 100-2200K
- ▶ nuclear forward scattering with 2 diametrical Be windows
- ▶ third Be window for nuclear inelastic scattered (NIS) radiation

Radial Distribution Chamber

- ▶ automatic sample transfer mechanism
- ▶ 6 sample magazine
- ▶ load-lock with UHV sample transfer box



Example Research Systems



Preparation & Analysis of Multilayer Interfaces*

Overview

- ▶ 2 x radial distribution chambers connected via re-orientation chamber
- ▶ connection to Kratos Axis Ultra XPS with dedicated preparation, load lock & sample storage chambers
- ▶ transport throughout at $<1\text{E-}9$ mbar (base pressures $<5\text{E-}11$ mbar)

Mu-Metal Analytical Chamber

- ▶ $<5\text{E-}11$ mbar base pressure
- ▶ XPS
- ▶ Monochromatic UPS
- ▶ ISS
- ▶ AES
- ▶ 5-axis UHV manipulator
- ▶ 2-rotational axes motorised for angular mapping
- ▶ sample holder temp range -180 to 1000°C

3-Level Preparation Chamber

- ▶ ion source
- ▶ LEED
- ▶ e-beam evapourator
- ▶ knudsen cells
- ▶ multiple spare ports

FT-IR Chamber

- ▶ commercial FT-IR can also be used standalone
- ▶ sample heating/cooling during analysis
- ▶ in-situ e-beam evapourator



*courtesy of MPI für Festkörperforschung

Example Research Systems



Physical Properties of High Tc Superconductors

Single Level Preparation Chamber

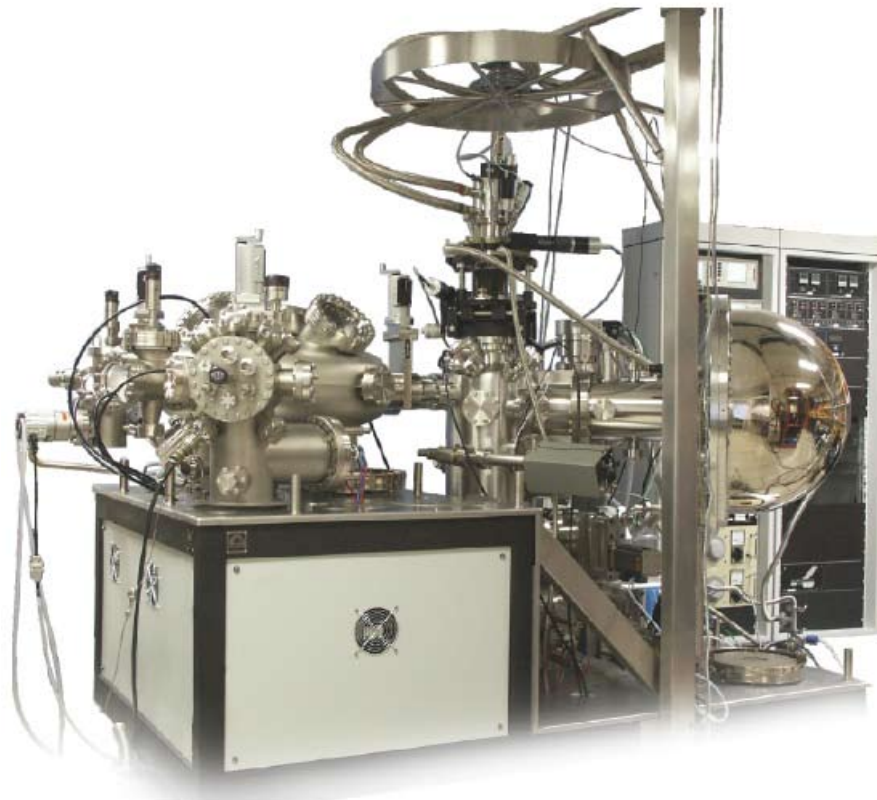
- ▶ ion source
- ▶ mass spectrometer
- ▶ multiple spare ports
- ▶ independently bakeable

Mu-Metal Analytical Chamber

- ▶ $<5E-11$ mbar base pressure
- ▶ monochromatic-UPS
- ▶ LEED
- ▶ 5-axis fully automated UHV manipulator
- ▶ rotatable analyser for use in lab and on beamline
- ▶ adjustable height and x-y frame

Ancillary

- ▶ 6 specimen sample park chamber
- ▶ load lock chamber
- ▶ UHV transfer at $<1E-10$ mbar



Example Research Systems



Soft X-Ray Beamline Research

Overview

- ▶ multi-user XANES & XPS
- ▶ high throughput photoemission analyser: SPECS 150-MCD, <math><5\text{meV}</math> resolution
- ▶ NEXAFS detector
- ▶ LN_2 and LHe cooling stage
- ▶ sample storage chambers
- ▶ flood gun
- ▶ dual anode x-ray source
- ▶ sample transfer at 120K
- ▶ rotary distribution to 8 chambers
- ▶ fast entry load lock with glove box
- ▶ sample fracture and sample parking chamber
- ▶ preparation chamber with evaporators & sputter targets
- ▶ automated, motorised manipulators
- ▶ support frame with large adjustment range



Example Research Systems



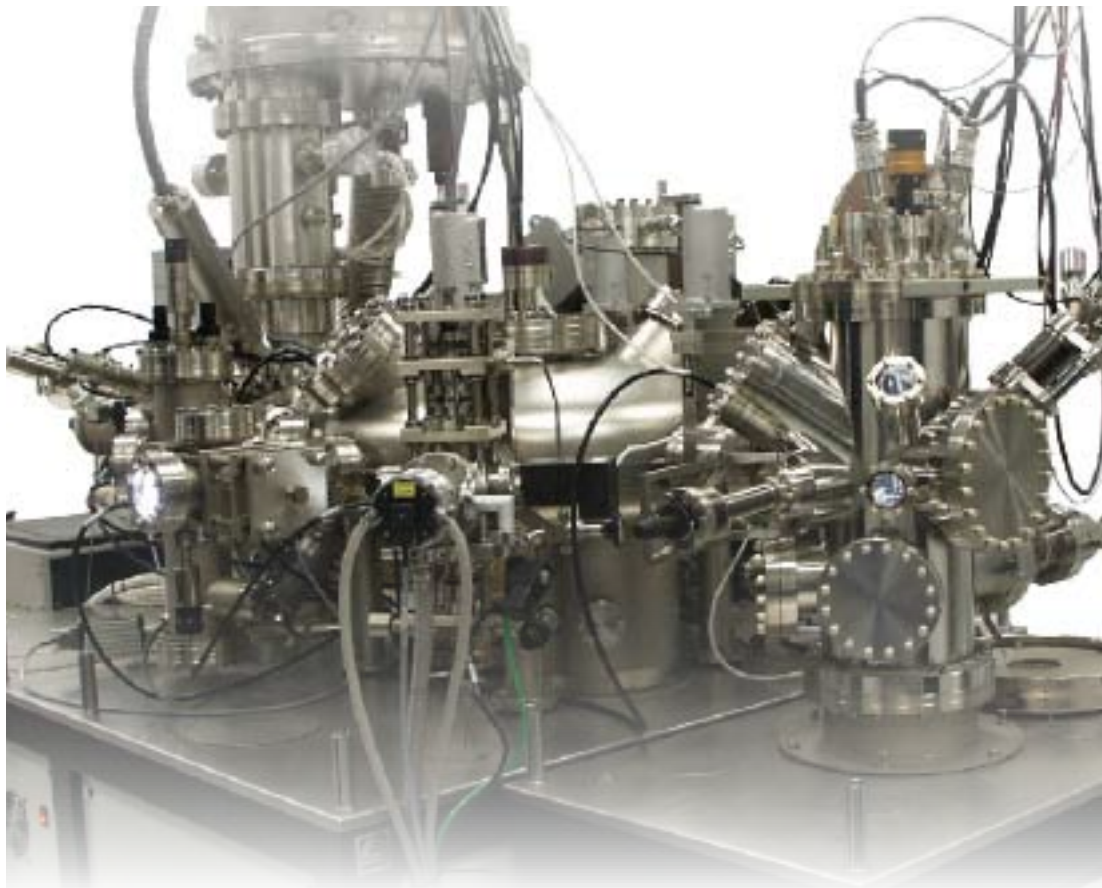
Chemical & Physical Properties of Solid State Surfaces

Microscopy

- ▶ variable temperature STM/AFM
- ▶ vibration isolation
- ▶ direct UHV sample transfer
- ▶ integrated e-beam evaporator
- ▶ tip-heating and magazine storage station

Mu-Metal Analytical Chamber

- ▶ $<5E-10$ mbar base pressure
- ▶ standard ESCA
- ▶ ESCA with $<9\mu\text{m}$ lateral resolution
- ▶ AES
- ▶ ISS
- ▶ UPS
- ▶ 5-axis manipulator
- ▶ sample temperature stage -180 to 2000°C



Example Research Systems



Catalysis

Spectroscopy Chamber

- ▶ UPS, AES & EPS techniques
- ▶ angular resolved & high resolution chemical imaging XPS (<1mm x 1mm)

Reaction Chamber

- ▶ sample load, transfer & storage with cleaning & surface preparation
- ▶ UHV flow through high pressure reactor
- ▶ 20bar and 650°C
- ▶ rapid heating at high pressure & UHV

Preparation Chamber

- ▶ AES/LEED spectrometer
- ▶ thermal desorption spectrometer
- ▶ ion source
- ▶ thermal evapourators
- ▶ e-beam evapourator
- ▶ 4-axis manipulator
- ▶ 90 to 2200K sample temperature

Microscopy Chamber

- ▶ variable temperature STM/AFM



Design & Manufacture

The described systems feature chambers, transfer mechanisms, sample stages and a wide range of instruments wholly manufactured in-house. The remaining sections provide some examples of these. Separate detailed brochures are also available on request or for download via our website.



Ion sources

Cleaning sources (inert & reactive gases) and primary ion sources (5keV, inert & reactive gases) with optional Wien mass filter. Ideally suited for vacuum surface cleaning and SIMS applications.



Focussed & flood electron sources

The ES 40C1 is a scannable source delivering small spot profile & high current over wide energy range. The FS 40A1 is a multi-use electron flood gun for charge compensation in XPS/AES/SIMS applications.



UV Source UVS 40A2

High intensity UV Source. Can be operated with various discharge gases (He, Ne, Kr, Ar, Xe or H₂).



E-Beam Evapourator EBV 40A1

Water-cooled. Evaporation rates from 0.1 monolayer/min to >1000 monolayers/sec. 4-15mm beam dia, temperature range 160-3300 degC. Suitable for a wide range of thin film growth and MBE applications.



X-Ray Source RS 40B1

High intensity twin-anode x-ray source for XPS. Minimum cross-talk between anode faces. Power Mg/Al 400/600 W. Less than 0.5 μ T at sample surface.



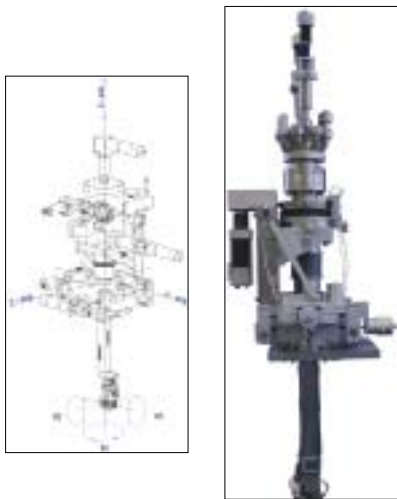
Effusion Cell EF 40C1

For MBE applications. Mo-free construction effusion cell. 0.1 degC temperature stability. 250-1500 degC operating temperature. PBN, PG or W crucibles. Manual or electro-pneumatic shutter.

Sample Manipulation

Design & Manufacture

Vacuum UHV manipulators with up to 6 degrees of freedom, manual or motorised and with a wide range of temperature controlled sample holders. Full range of vacuum UHV manipulators, z-shifts, linear and rotary feedthroughs and xy stages.



Multi-Axis Manipulators

High precision multi-axis UHV manipulators with a wide range of configuration options.

- upto 6 axes
- manual or motorised or combinations of each
- wide range of sample holders
- continuous 360 degree rotation through any angle
- regular or wide through bores
- wide range of heating, cooling & electrical options



Manipulators with He cryostat

Closed cycle ARS cryostat head with combination of Z-shift, XY stages and differentially pumped rotary feedthroughs. Manual or motorised versions.



Linear/Rotary feedthroughs

Bellows sealed vacuum feedthroughs. Rotary version has continuous 360 degree rotation. Custom lengths & diameters. Also differentially pumped rotary feedthroughs and wobble sticks.



Z-Shifts

Very wide range of UHV compatible z-shifts of many lengths and bore size options, both manual and stepper motor driven. Standard & high resolution versions available.



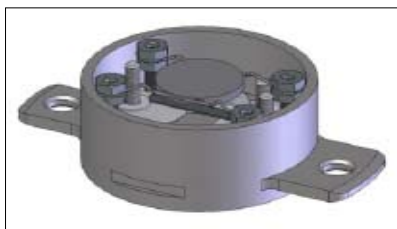
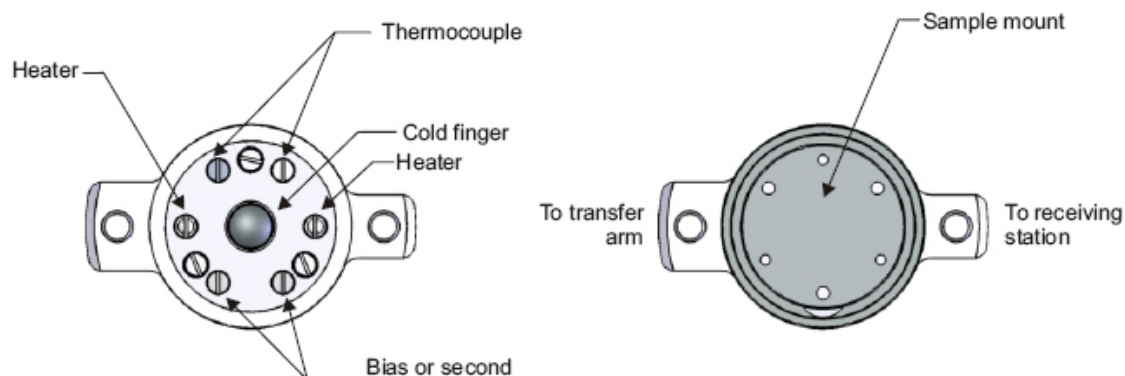
XY Stages

High rigidity specimen translators. Many size options. Both manual and motorised versions are available.

Sample Holders

Design & Manufacture

Precision controlled, high accuracy and reliability UHV sample holders with electrical (bias, Faraday cup, quartz balance), resistive and electron beam heating (to 2000°C) and cooling (to -180°C). All models are based around one standard design and all critical parts can be replaced without breaking vacuum. Below is just a selection. Our web site & separate brochure details the full and ever expanding range.



PTS 2000 EB

2000 °C
LN₂ cooling



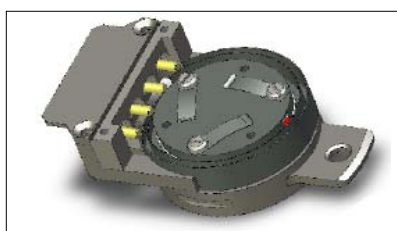
PTS 1400 OMC

1400 °C
LN₂ cooling
adapter to Omicron sample holder



PTS HPC

powder samples in high pressure reactors
650 °C
-100 °C



PTS 1000 RES/C

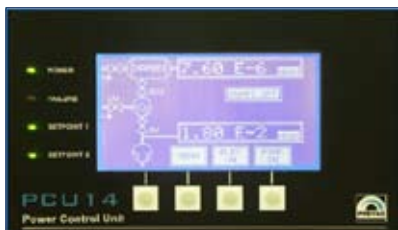
additional sample contacts for MBE applications
resistive heating 1000 °C
cooling -170 °C

Vacuum Modules & Accessories

Design & Manufacture

All of our instruments, vacuum subsystems, components and manipulation are designed, fabricated and integrated with our own electronics and software.

Each item is also available off the shelf in standalone form for adding to, or improving upon, your existing systems. Below are just a few examples.



Device controllers: keypad and software control

- Combined pump, gauge, valve power controllers
- Dual channel ion gauge controllers
- Bakeout controllers
- Instrument controllers



Vacuum & UHV chambers

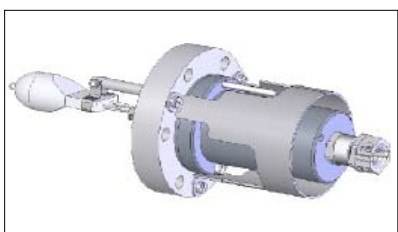
- sample preparation & introduction chambers
- re-orientation chambers
- load lock chambers
- analysis chambers
- deposition & growth chambers
- flow through & static high pressure chambers

UHV vacuum design is available in a wide range of materials including OHFC copper and mu metal



Feedthroughs

extensive range of instrumentation feedthroughs



Bakeout

- internal and external bakeout components
- dual zone controllers



Glove Box

custom design glove boxes with load-lock for up to 5 sample holders

Henniker Scientific



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