

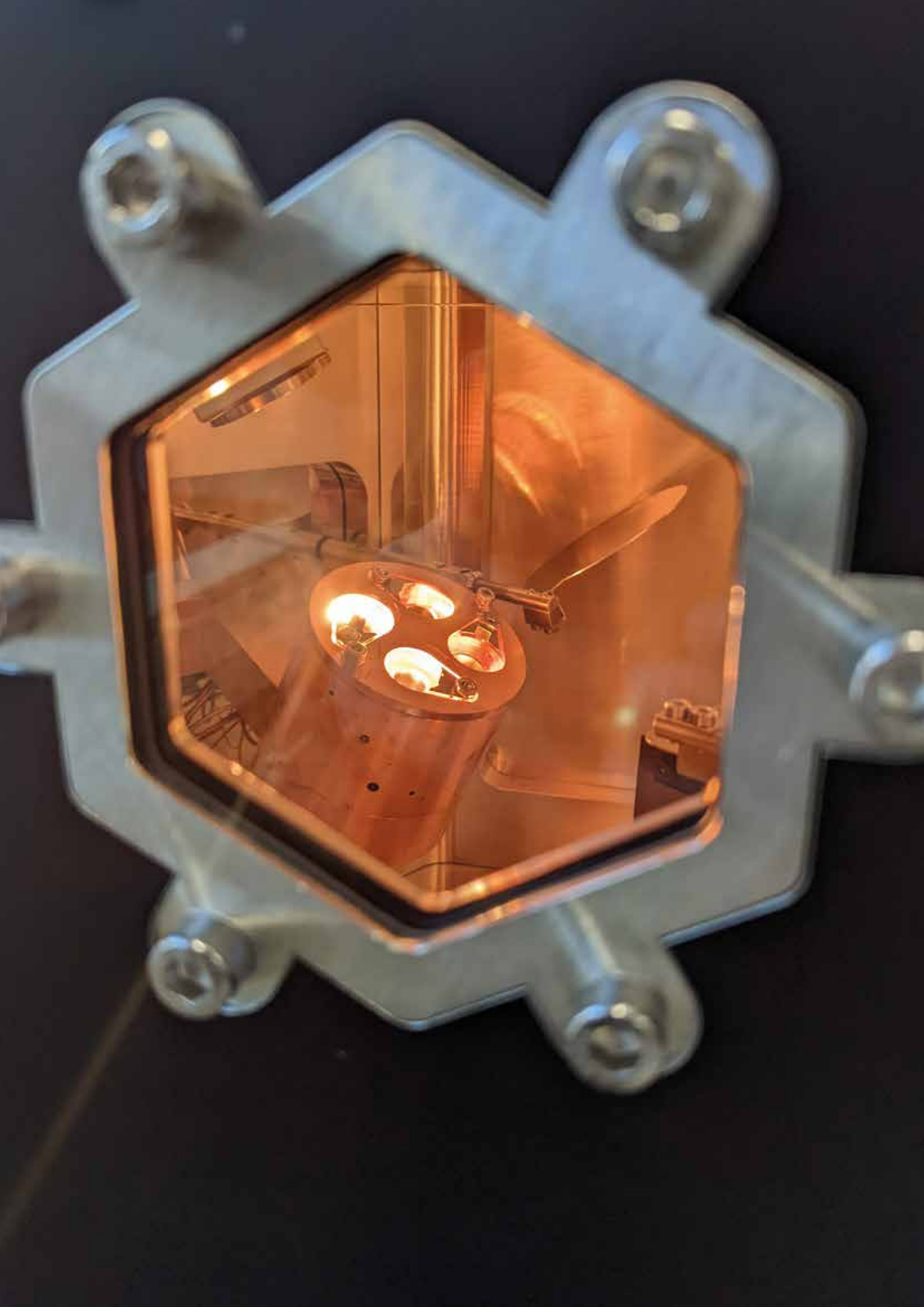


HEX Platform

HIGHLY MODULAR PVD SYSTEMS

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 A Judges Scientific company



Welcome to the HEX Platform

Highly modular PVD systems with a unique open-frame architecture, offering an unmatched level of user control, customisation and upgradability to researchers in thin-film deposition.

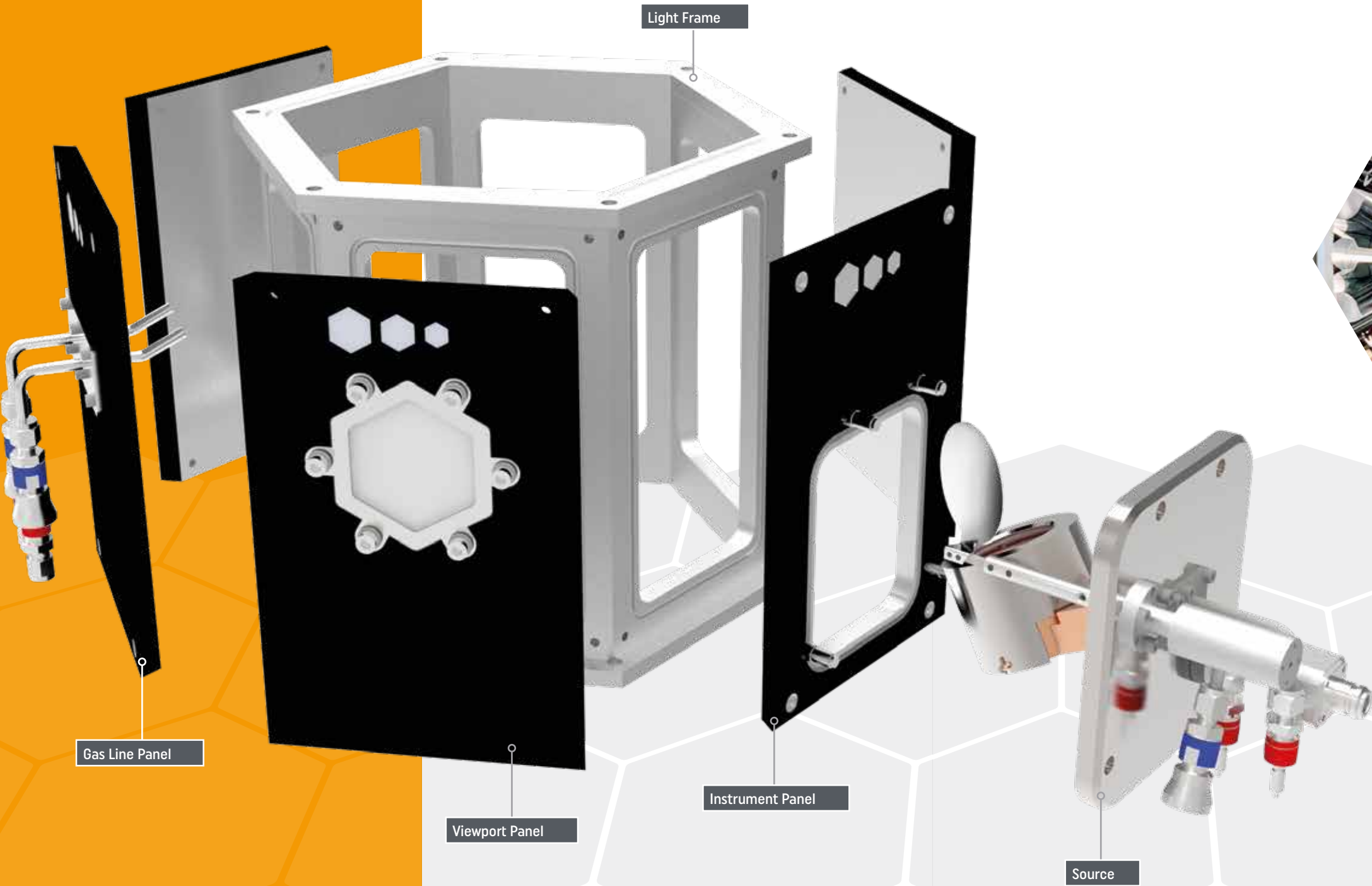
The HEX platform of thin film deposition systems provides a versatile range of deposition options for your research. Starting from the base system, the unit can be later upgraded and customised to different configurations of deposition sources or third-party instruments. These upgrades are modular and simple to install, providing a cost-effective, future-proof solution while eliminating system downtime. Whatever direction your research takes you in, the HEX Platform is by your side.



The HEX platform of deposition systems is highly flexible and versatile, offering users the ability to reconfigure and upgrade their chambers at will.

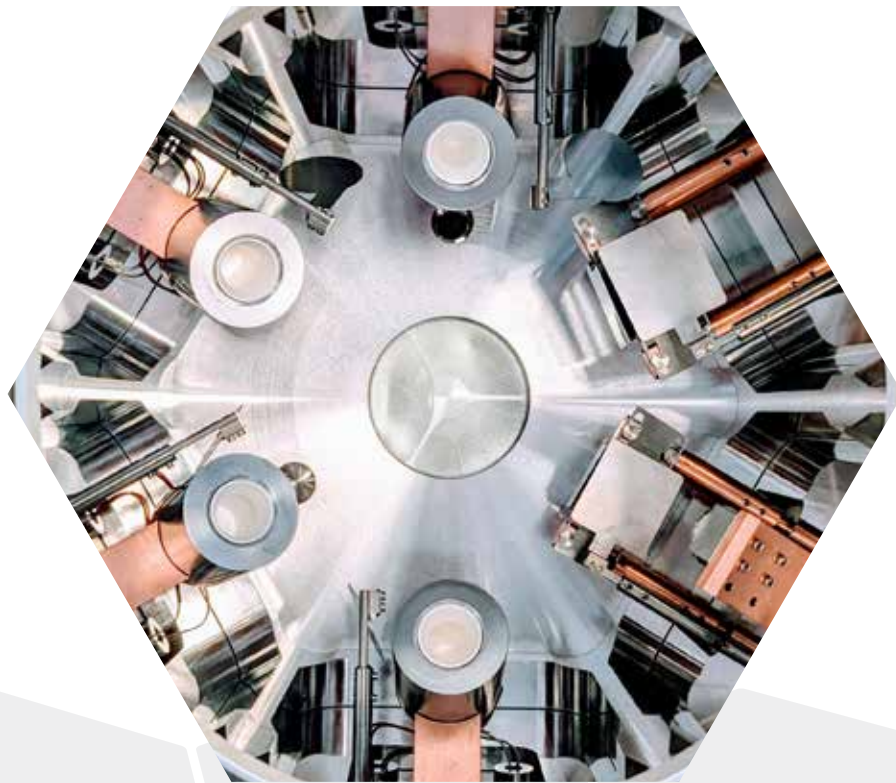
ADAPTABLE CHAMBER DESIGN

In contrast to conventional PVD systems which attach instruments using welds, the HEX platform utilises viton gasket o-ring seals almost exclusively. This allows for its ground-breaking open-frame architecture, in which all panels can be removed, interchanged and reattached quickly and efficiently, minimising downtime during system reconfiguration and maintenance procedures. This concept is the bedrock upon which the flexibility of the HEX platform is built.



COMPACT CONVENIENT DESIGN

The HEX platform is benchtop or can be positioned on a portable electronics rack, saving valuable lab space, whereas the HEX-L and HEX-XL sit on a movable frame. This means that all three instruments can be quickly and easily moved around a lab, or between different labs- allowing for flexibility not just in the instruments themselves, but in where and by whom they can be used.



HEX

The smallest system in the HEX platform features a compact benchtop or rack-mounted design. It accommodates a 4" sample stage with capacity for up to 3 deposition sources, providing a flexible solution for smaller-scale coating applications.



The HEX system features detachable panels for easy reconfiguration, chamber and source maintenance and chamber cleaning. The compact design keeps the system footprint to a minimum with the chamber and electronics rack standing at just under 1.5m. The chamber is fitted with a fully automated, turbopumped assembly and comes fully integrated with the Korvus Niobium software. The entire chamber can be manufactured in either aluminium or steel.



SPECIFICATION

- Maximum Sample Size Diameter: 4" (100mm)
- Deposition Sources: Up to 3
- Magnetron Sputter Size (Diameter): 1" or 2"
- Chamber Volume: 12 L - (24 L When Stacked)
- Base Pressure: $<5 \times 10^{-7}$ mbar*
- Operational Pressure (mid 10⁻⁶ mbar): <20 mins
- Max Throw Distance: 12cm / 45cm (stacked)
- Glovebox Compatible
- Available in Aluminium or Steel

*Ultimate base pressure is on factory tested systems. Subsequent base pressure depends on a variety of factors such as chamber cleanliness, user operation and lab environment.

HEX-L

The HEX-L is the next step in the HEX platform, featuring an integrated framework and enhanced customisation. It accommodates a 6" sample stage with capacity for up to 6 deposition sources, plus third-party sources and a load-lock assembly for manual or automated sample transfer.



The HEX-L system's increased size allows for further customisation and hardware integration, starting with the ability to transfer samples under vacuum into the chamber via a load-lock attachment and pneumatic gate valve. It also allows integration of larger third-party deposition sources such as high-powered e-beams, nanoparticle deposition sources and remote plasma sputtering sources.

The system comes fitted with a cable management system that ensures that all electrical parts are protected and organised. The chamber panels can be customised to create a specified deposition distance if required and the chamber can be stacked to increase the throw distance of sources to a dedicated distance.



SPECIFICATION

- Maximum Sample Size Diameter: 6" (150mm)
- Deposition Sources: Up to 6
- Magnetron Sputter Size (Diameter): 1", 2" or 3"
- Chamber Volume: 50L - (100L When Stacked)
- Base Pressure: $<5 \times 10^{-7}$ mbar*
- Operational Pressure (mid 10⁻⁶ mbar): <20 mins
- Max Throw Distance: 24cm / 60cm (stacked)
- Loadlock Option
- Glovebox Compatible
- Cluster Compatible
- Available in Aluminium or Steel

*Ultimate base pressure is on factory tested systems. Subsequent base pressure depends on a variety of factors such as chamber cleanliness, user operation and lab environment.

HEX-XL

The HEX-XL is the largest and most flexible system in the HEX series. Its standard 8" sample stage, expandable to 12", enables larger surface coatings.

The increased chamber volume supports 3D samples, small-batch coatings, and a wide range of custom configurations.



The HEX-XL is the ideal base system for larger sample and batch coating needs due to its wider chamber frame. This wider frame also allows for larger panel sizes and so larger components can be included and mounted.

The HEX-XL, like the HEX-L, can integrate the full range of Korvus sources and a wide range of third-party sources such high-powered e-beams, nanoparticle deposition sources and remote plasma sputtering sources as well as a range of analysis techniques.

The system frame is mounted directly onto the base rack for stability and seamless cable management. The chamber panels can be customised to create a specified deposition distance and the chamber can be either stacked or extended to increase the throw distance of sources to a dedicated distance. Its larger size also allows for the addition of more sources.

SPECIFICATION

- Maximum Sample Size Diameter: up to 12" (300mm)
- Deposition Sources: >6
- Magnetron Sputter Size (Diameter): 1", 2", 3" or 4"
- Chamber Volume: 86 L - (172 L When Stacked)
- Base Pressure: $<5 \times 10^{-7}$ mbar*
- Operational Pressure (mid 10^{-6} mbar): <20 mins
- Max Throw Distance: 24cm / 60cm (stacked)
- Loadlock Option
- Glovebox Compatible
- Cluster Compatible
- Available in Aluminium or Steel

*Ultimate base pressure is on factory tested systems. Subsequent base pressure depends on a variety of factors such as chamber cleanliness, user operation and lab environment.

CLUSTER SYSTEMS

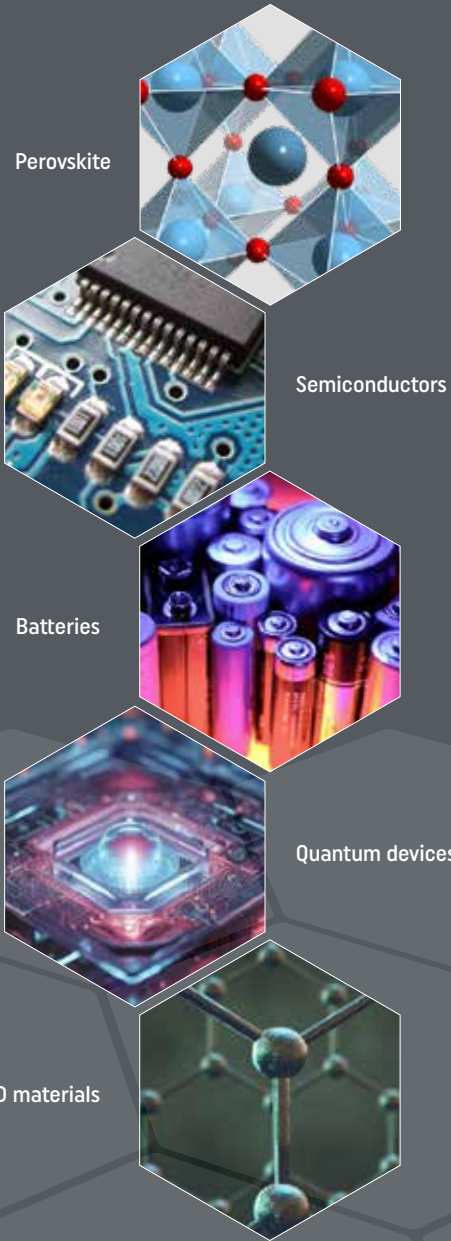
Sticking to its modular philosophy, the HEX Cluster allows users to begin with a single chamber, then add subsequent chambers when research demands. This can be done at any point in the system's life, without any reconstruction of the chamber and virtually no downtime.

Cluster Type	Number of Chambers	Operation Type
Linear Transfer Cluster	Up to 3	Manual/Automatic
Robotic Transfer Cluster	Up to 6	Automatic



APPLICATION

Cluster systems are vital in applications where contamination between different classes of material must be avoided, while maintaining purity from in-vacuum sample transfer.



The Linear Transfer Cluster utilises a **UHVD** transfer arm for seamless and cost-effective exchange of wafers between chambers.

CLUSTER SYSTEMS

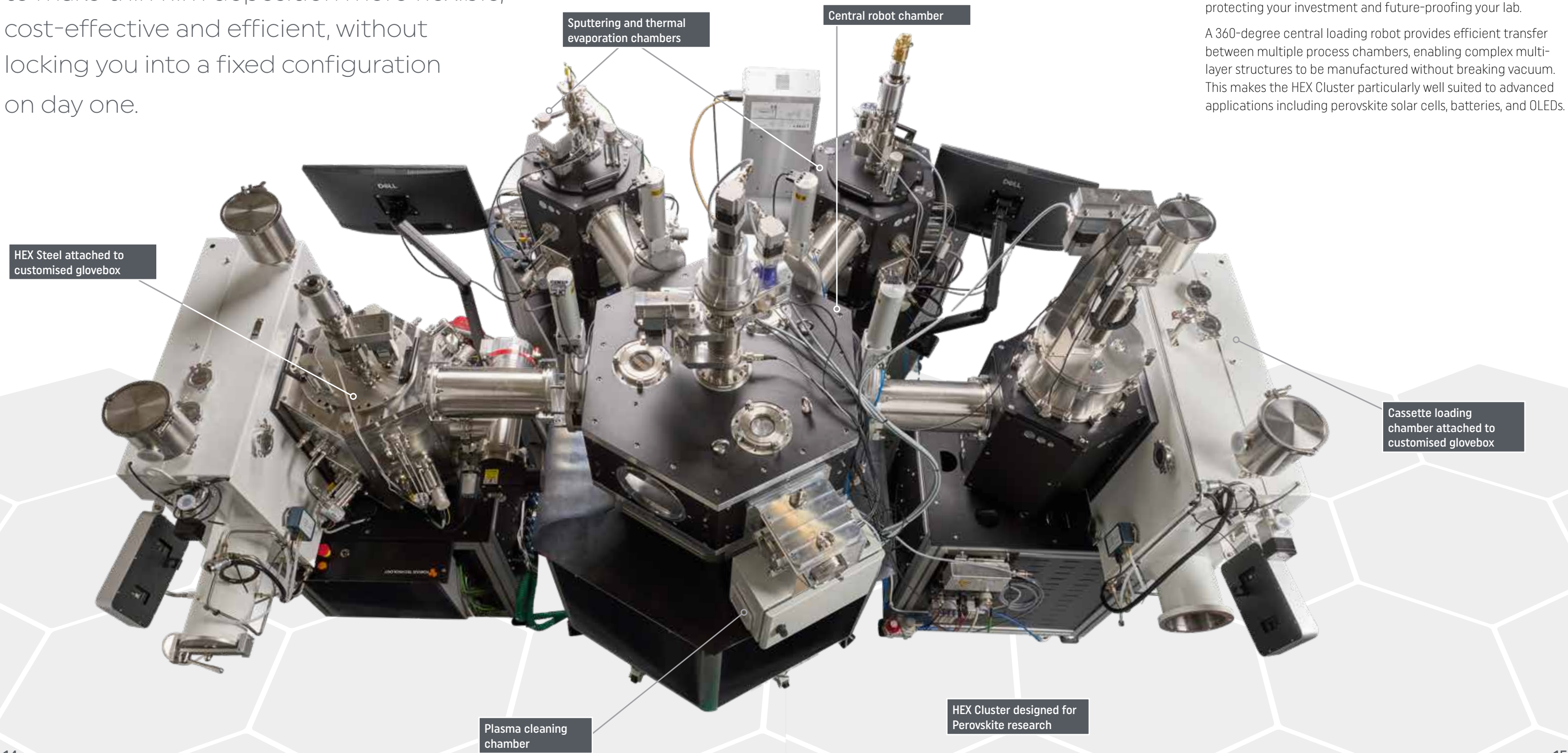
Built on the HEX platform's philosophy of flexibility and upgradability, the HEX Cluster lets you start with a single HEX-L chamber and add further chambers over time — all linked by in-vacuum sample transfer. It's a solution designed to make thin film deposition more flexible, cost-effective and efficient, without locking you into a fixed configuration on day one.

Uniquely modular, future-proof design

Because each chamber can be dedicated to a different stage or technique, a cluster system lets you build multi-layer films from different material classes, separate process steps to avoid cross-contamination, and expand capacity simply by adding chambers, sources or tools as your research evolves.

Due to the HEX platform's unique modular design, it's built to grow with your budget or change when your research does — protecting your investment and future-proofing your lab.

A 360-degree central loading robot provides efficient transfer between multiple process chambers, enabling complex multi-layer structures to be manufactured without breaking vacuum. This makes the HEX Cluster particularly well suited to advanced applications including perovskite solar cells, batteries, and OLEDs.



CLUSTER SYSTEMS

Automated Wafer Handling for the Cluster Platform

At the heart of Korvus's new cluster system is a robotic arm from UHV Design, fully integrated and controlled via the system's PLC. This automated handling solution transfers wafers and masks with precision to the designated chamber, ensuring consistent, repeatable positioning across every process cycle.

By removing manual intervention from sample transfer, the system reduces contamination risk, improves throughput, and supports the reliability demanded by high-value thin-film applications.

Integrated Plasma Cleaning

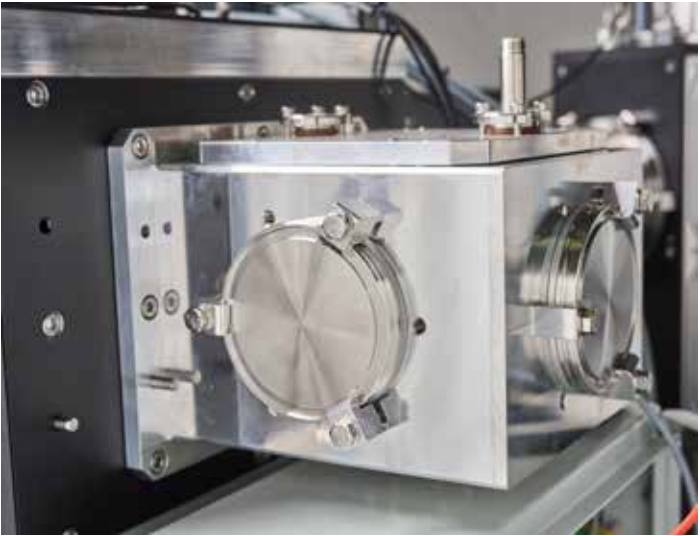
Positioned within the central transfer chamber, alongside the UHV Design robotic arm, the cluster system's integrated plasma cleaner treats each substrate before it enters any of the HEX-L process chambers. Using plasma sputtering, energetic ions bombard the substrate surface to remove contaminants or activate it for deposition. This in-situ preparation step takes place without breaking vacuum, ensuring optimal film adhesion and nucleation while reducing overall processing time.

Cassette Loading for Continuous Operation

Wafers and masks are staged in a cassette loading system, ready for collection by the robotic arm. This allows multiple samples to be queued and processed continuously within a single run, without the need for operator intervention between samples. The result is significantly improved throughput and system efficiency, making the cluster platform well suited to high-volume production environments.

Cryogenic Trapping for Perovskite Processing

For perovskite deposition, the cluster system incorporates a cryogenic head that condenses volatile species released during and after deposition. By trapping these by-products directly within the chamber, the cryo head protects vacuum integrity and prevents contamination, supporting clean, repeatable results for perovskite and other sensitive material processes.



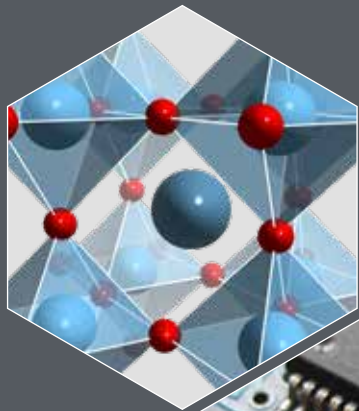
Integrated plasma cleaner



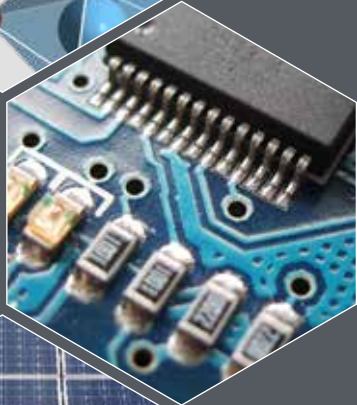
3-axis rotary telescopic transfer arm



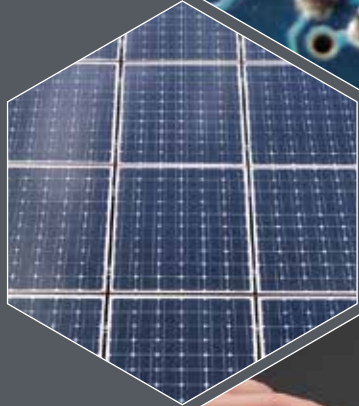
High specification gate valve



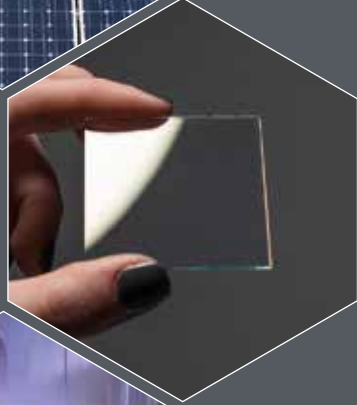
Perovskite research



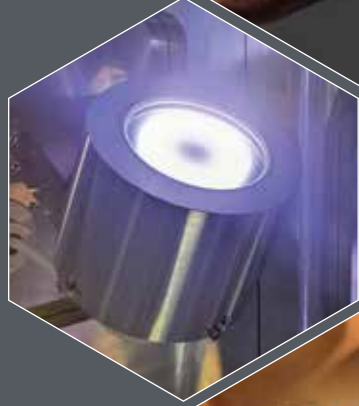
Research and development of new coatings



Solar cells, semiconductor and battery R&D



Optical coatings



Sputter deposition



Teaching and training

APPLICATION

The unique open-frame design and flexibility of the HEX make it a powerful platform for a range of applications; including solar research, semiconductor applications and teaching.

CUSTOMISE WITH EASE

Seamless integration of third-party instruments

HEX platform panels are easily changed, allowing for the modification of the vacuum chamber. This unique feature enables easy addition of any instrument after initial system purchase, eliminating costly design work, engineer visits, and system downtime.



The HEX platform offers an unrivalled ability to be customised

With its unique modular design, the HEX platform offers the ability to integrate a range of third-party deposition and analytical techniques. This provides unparalleled options for modification and enhancement.

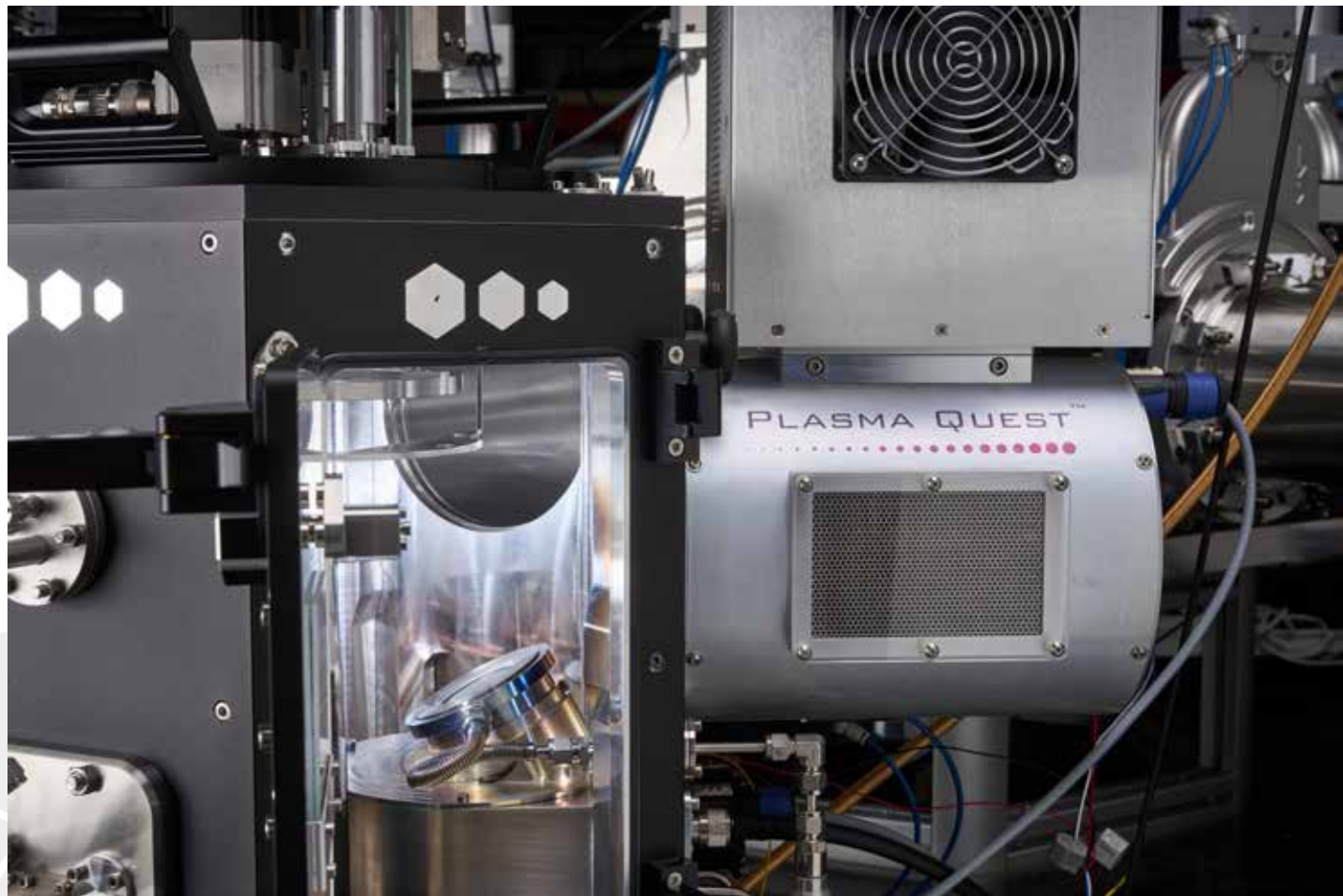


HEX-L with THERIS Nanoparticle Deposition Source

UNIQUE DEPOSITION TECHNOLOGIES

Unique Deposition Technologies

The HEX platform is uniquely positioned for the integration and operation of unique deposition technologies. This feature is thanks to the modularity of the systems and allows for the boundaries of PVD coatings to be pushed through Korvus' strategic partnership with novel technology suppliers.



2" Plasma Quest HiTUS source integrated on HEX-L

HiTUS® Remote Plasma Sputtering Sources

Remote plasma sputtering can be incorporated into a Korvus system through the integration of the **PLASMA QUEST™ HiTUS®** source. This source uses an inductively coupled source to generate a remote plasma that is independent to the target, this allows for the decoupling of the plasma density from the target bias and offers advantages in the generation of high-quality oxide/nitride films and the ability to sputter from thick magnetic targets. The decoupling process also allows for a 90% material utilisation rate compared to 40% for conventional sputtering.

The HiTUS® source can be integrated into any HEX-L or XL system and can be used in tandem with other Korvus sources to produce complex compound films and offers unrivalled benefits in the production of reactively sputtered films for applications such as photovoltaics and optical filters.



Nanoparticle Deposition Sources

Traditional sputtered films that can be used in a wide range of applications, but sometimes, there are benefits in depositing materials that are already clustered into nanoparticles prior to deposition. The NanoStream from Theris Nanotechnology offer the capability to tune the size of these ultra-pure nanoparticles, as well as create compound, high-entropy and core-shell nanoparticles. Due to the charged nature of these generated nanoparticles, they can also be accelerated towards the sample giving a further manipulation technique for sample coating.

The Korvus HEX platform can integrate the full range of the NanoStream sources, core-shell coaters and mass filters to facilitate and cater to applications such as photovoltaics, energy storage and medical devices.



FUTURE-PROOF

COMPLETE FLEXIBILITY IN YOUR PROCESS

Stack it

Stack your HEX platform at any point in its life to optimise process parameters when longer throw distance is needed.

Chamber	Single Chamber/ Stacked Volume	Max Throw Distance: Single/Stacked
HEX	12L/24L	12cm/~45cm
HEX-L	50L/100L	24cm/~60cm
HEX-XL	86L/172L	24cm/~60cm

Upgrade or Modify with Ease

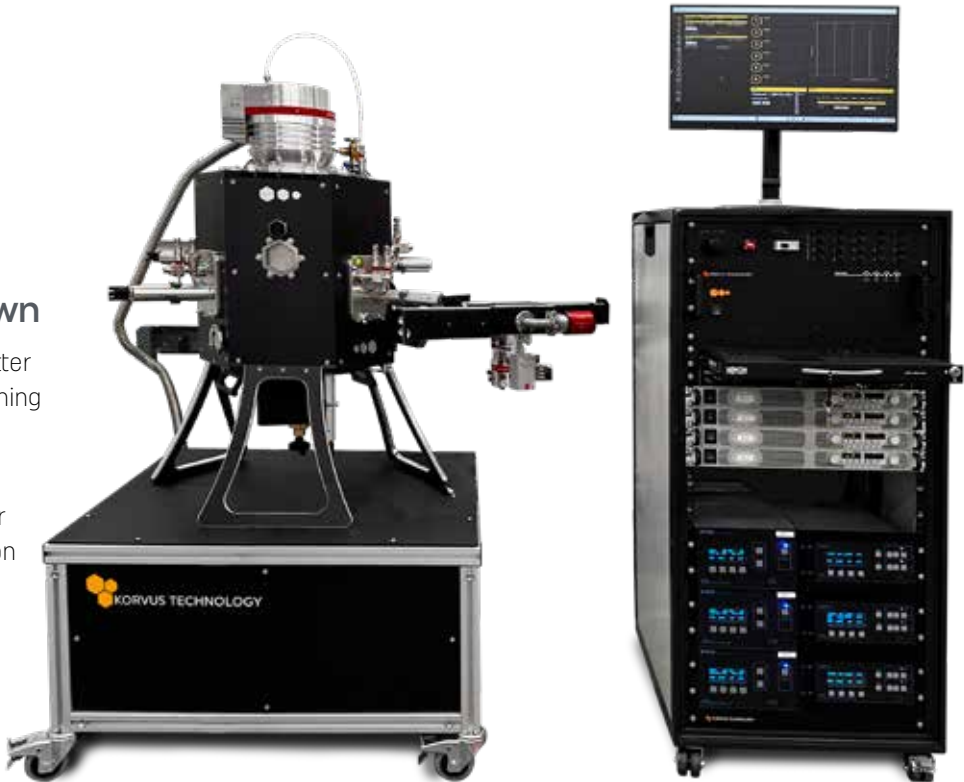
Add sources at any point in the systems life without needing engineer visits or system downtime.



Sputter up or Sputter down

The HEX Platform can be placed in a sputter down or sputter up configuration by switching the detachable top and bottom plates.

Sputter up can be useful for evaporative methods and reducing dust, while sputter down completely eliminates shadowing on heavier samples.



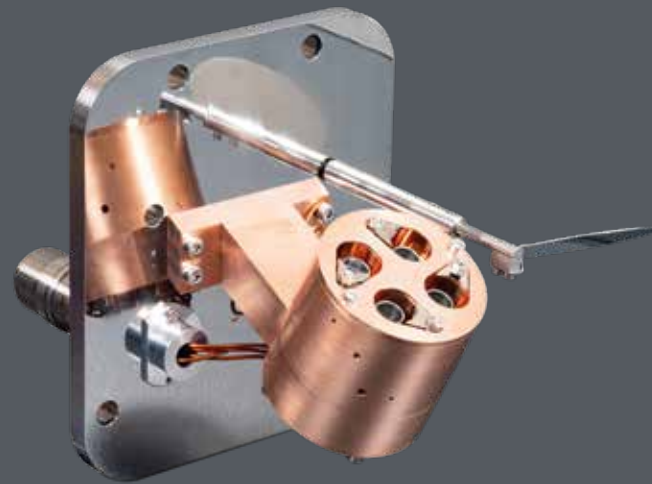
Source to Substrate Distance and Angle

Utilise the HEX Platform' modularity to change source-sample distance and angle at will. This gives users complete control over their process parameters, useful for optimising uniformity, deposition angle and thermal load on the substrate.



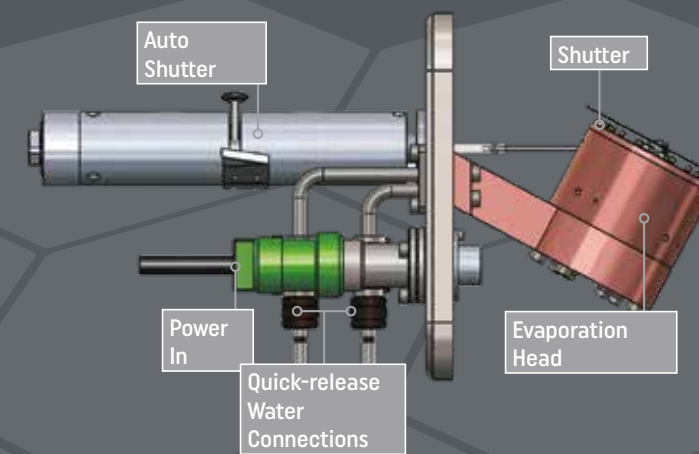
TAU

ELECTRON BEAM EVAPORATION SOURCE



Our high-accuracy mini E-beam evaporator is ideal for ultra-thin film deposition of metals with reliable process control.

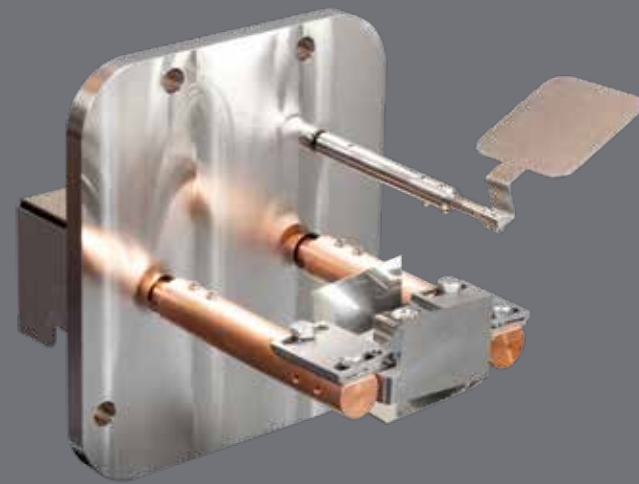
The TAU is a four-pocket source, providing multi-deposition options in one. The control electronics allows up to four sources/pockets to be operated sequentially or simultaneously. Material can be evaporated from rods or material held in a crucible.



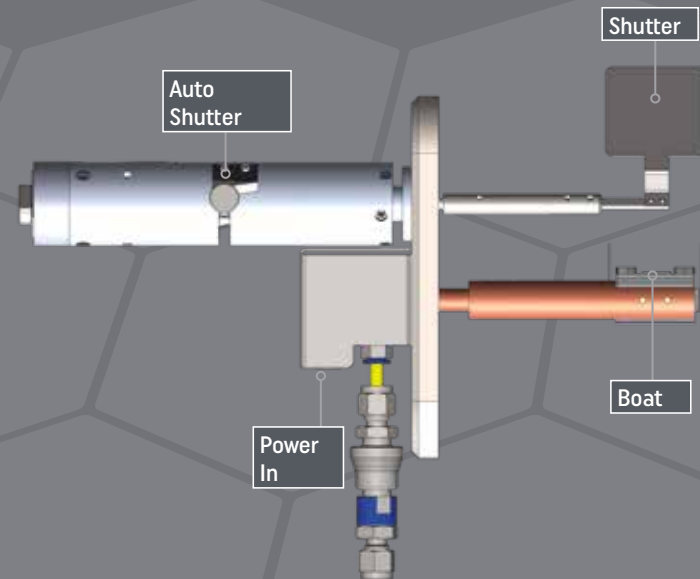
Pockets	4
Maximum Power Per Pocket	250W
Materials	Rods (max 4mm dia), Crucible (1 or 2 cc)
Co-evaporation	Yes
Cooling	Water (min 0.5l/min)

TES

THERMAL EVAPORATION SOURCE



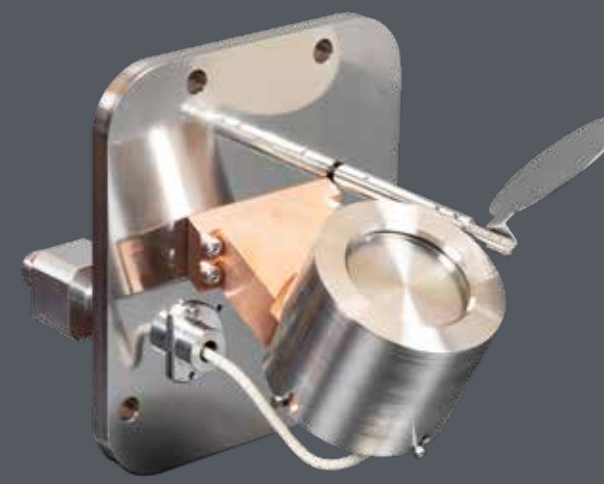
The thermal boat source allows for the integration of a range of thermal boats for the deposition of both metals and organics/ polymers. The most cost effective source.



Boat Volume	1cc to 5cc
Temperature Range	50-2200°C (material dependent)
Power Supply	DC, 1.2kW

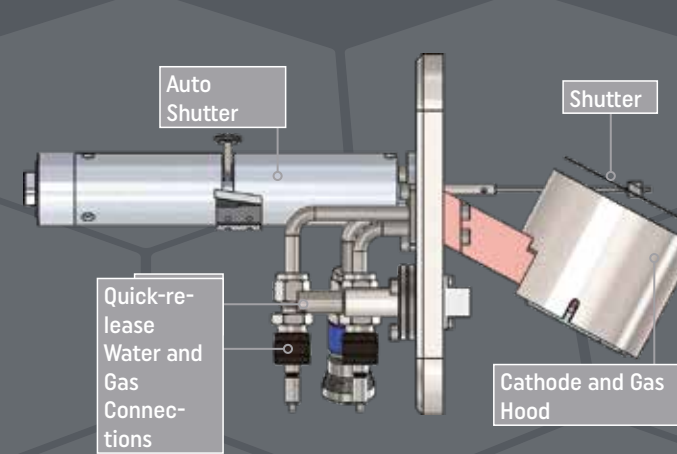
FISSION

MAGNETRON SPUTTERING SOURCE



Available in 2" to 4" diameter, the sputter sources are equipped with SmCo magnets and accept targets with thickness ranging from 0.5 to 6.5mm of non-magnetic materials and up to 2mm for magnetic materials.

The sources can be used with DC, RF, pulsed DC or HIPIMS power supplies.



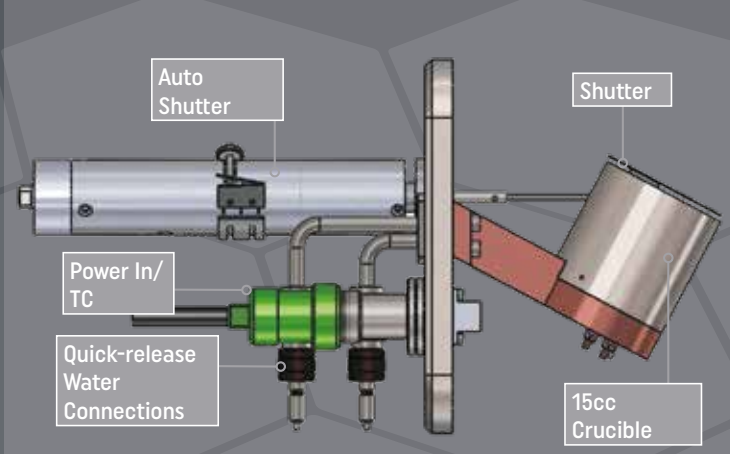
Target Diameter	50mm (2") 75mm (3"), 100mm (4")
Maximum Target Thickness	6.5mm (2mm magnetics with strong magnets)
DC Power Supply	780W (600V, 1.3A)
RF Power Supply	300W (13.56MHz)
Cooling	Water (min 0.5l/min)

ORCA

ORGANIC EVAPORATION SOURCE



The ORCA organic deposition source facilitates stable operation between 50 and 600°C. Sensitive organic materials can be evaporated with precise control due to water-cooling and temperature feedback loop.



Crucible Volume	5cc-15cc
Temperature Range	50-600°C
Thermocouple	type K
Power Supply	DC
Cooling	Water (min 0.5l/min)

SAMPLE STAGE

Selecting the correct sample stage for a specific application is as important as choosing the correct deposition method. The features of the sample stage can affect the uniformity, the morphology and the resulting film composition and crystallinity.

The HEX platform can be equipped with stages ranging from 2" to 12" depending on chamber size, customer requirements and application. All sample stages can be equipped with either a manual or an automated shutter. The system features a convenient set of mounting posts to secure the stage when replacing samples or a standalone stage for larger stage options. Samples can also be mounted through the chamber front-loading door (HEX-L & XL only).

Sample Rotation

The stage may be upgraded to magnetically operated sample rotation. The rotation improves the film uniformity and is recommended for samples with dimensions greater than 15mm and/or where good uniformity is important.

Bias Table



Optional sample table bias can be used for soft substrate pre-cleaning (RF) or to change the properties of your film.

Options

- DC or RF
- Manual or Automatic sample Shutter

Sample Heating

The rotating stage has options for heating to 500°C - 800°C which will result in improved film morphology for some materials during deposition or for post-annealing and can utilise a range of heating elements depending on temperature spec, process atmosphere and contamination risks.

Rotating/Heating Table



The rotating (and optional heating) sample stage dramatically improves deposition uniformity and is recommended for samples >15mm

- K-type thermocouple

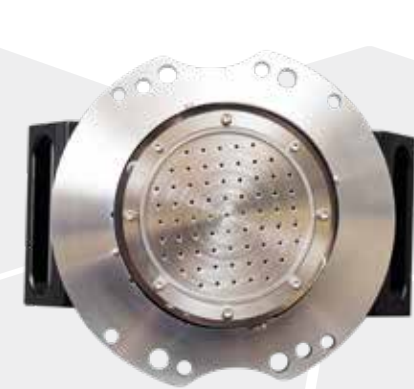
Options

- 500°C - 800°C heating option
- Bias option
- Manual or Automatic Sample Shutter

Sample Cooling

A rotating water-cooled or static cryogenic sample stage can be employed to reduce unwanted uncontrolled temperature-rise in sensitive samples such as during the coating stage in lift-off processes.

Cooled Table



The water-cooled or cryogenic stage allow temperature-sensitive samples to be coated without danger of thermally induced damage. Control is either active or passive.

Options

- Manual or Automatic Sample Shutter

Heating underneath:
4" Sample Stage
Rotating Heating



Customisable Sample
Holder Plate

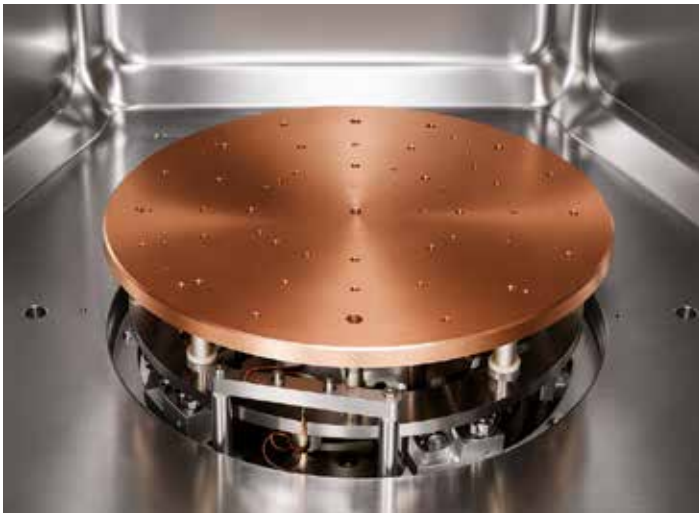


Z-Shift

Adjustable source-to-sample distance through a zshift mechanism. This can be controlled either manually, or through a software controlled motor.

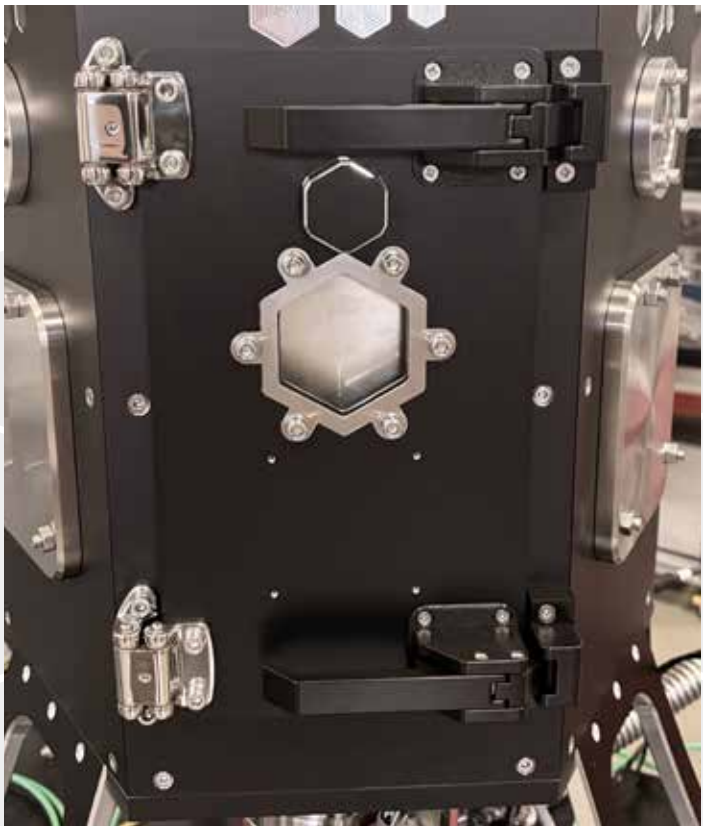
Load-Lock

All bias and heated stages can be upgraded to facilitate sample transfer via an external load-lock. This can be done through either an automated or manual z-shift.



Custom Stages

Custom designed stages to suit your application. The stage above can heat to 800°C and hold samples up to 5kg, while also being biased and rotating.



Front Door

HEX-L and XL can both be fitted with a front door for easier substrate and sample loading.



GLOVEBOX INTEGRATION

Bottom Mounted Glovebox Integration

The HEX platform is ideally suited to air-sensitive research applications that require a glovebox. The unique design means the system can be integrated underneath the glovebox, for air sensitive substrates, or to the back of the glovebox, for air-sensitive substrates and materials.

Bottom mounting uses minimal space in the glovebox itself, and allows easy access for cleaning and modification.



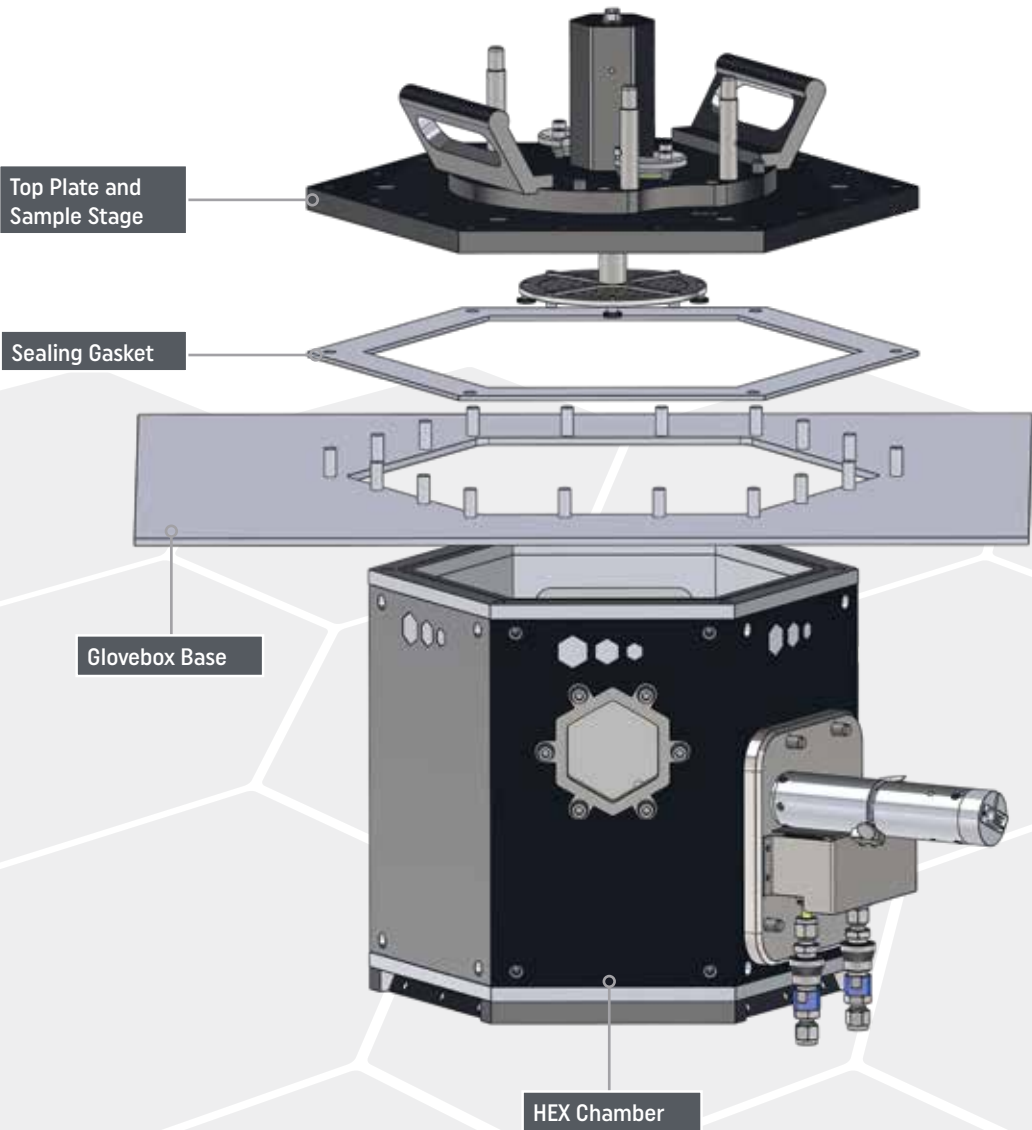
HEX-L steel attached to back of glovebox



HEX-L steel attached to back of glovebox

Front Mounted Glovebox Integration

The front-mounted configuration occupies a single panel, leaving the remaining five panels free for source integration and easy access from the rear. This custom glovebox has been developed in collaboration with Vigor, its short depth allowing the chamber to be easily accessed from inside the glovebox.



HEX-L attached to customised Vigor glovebox

NIOBIUM

AUTOMATION SOFTWARE

OVERVIEW

The Niobium PLC Automation Software package allows the user full control over the HEX platform's deposition system and components. The full dataset is automatically logged, charting of multiple parameters is possible and sophisticated process recipe programming is enabled via step-based procedures including looping and conditional options.

Modular software design allows easy addition of control units when upgrading the system. Our proprietary software facilitates the addition of Korvus-manufactured, as well as third-party components to your system.

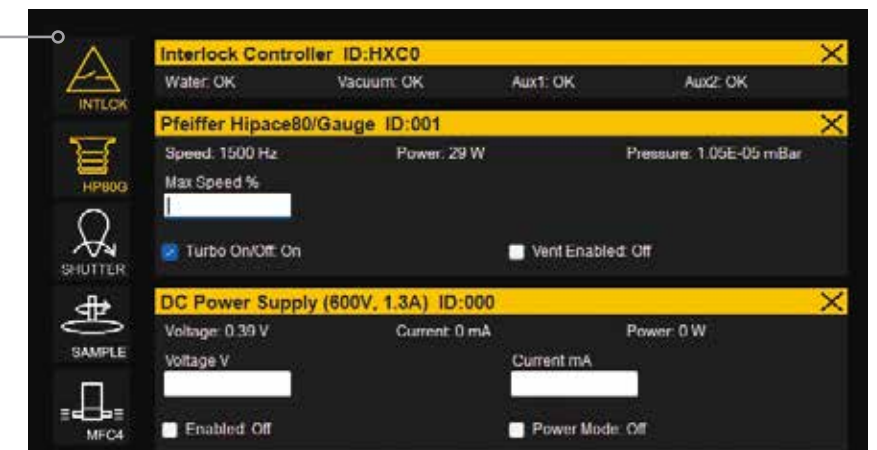


Industrial PLC Control, Simplified by an Intuitive HMI

Modular software design allows easy addition of control units when upgrading the system. Our proprietary software facilitates the addition of Korvus-manufactured, as well as third-party components to your HEX, HEX-L or HEX-XL.

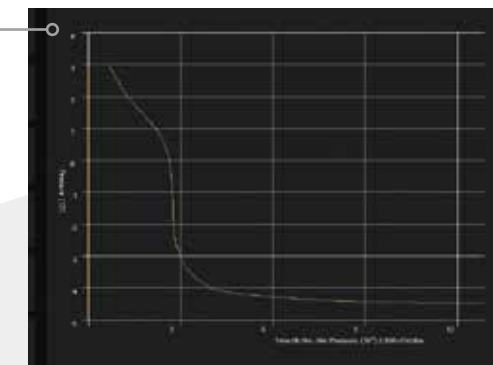
Instrument Control

- Connected electronics units are represented by icons, which are clicked to show or hide the detailed parameter set for the unit
- All parameters can be renamed by the user



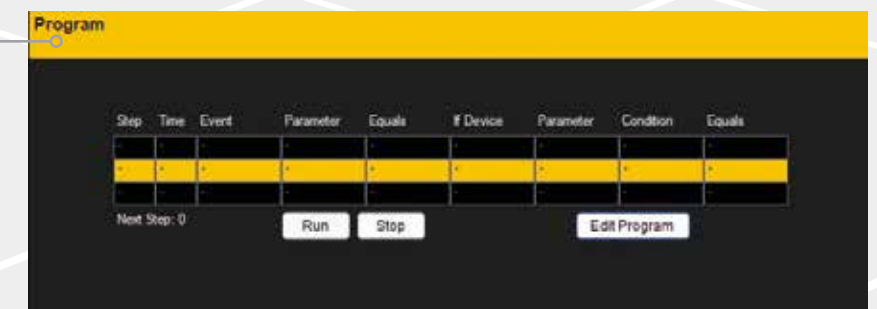
Charting/Logging

- Multiple parameters can be charted simultaneously.
- Autoscaling and zoom functions
- Automatic logging of all system parameters into a CSV file



Programming

- Programming of deposition processes via time-based event procedures
- Programs can be stored and incorporated into new programs
- Looping allows repetition of processes
- Conditional programming allows steps to complete only if certain conditions are met. For example, a source shutter can be closed when the measured film thickness on a QCM is above a certain value



HEX Mini

The HEX Mini is Korvus Technology's compact, entry-level PVD (physical vapour deposition) system for the production of thin films. Applications include optical coatings, sample preparation for SEM/TEM and electrical contacts.

A "plug and play" deposition system with quick setup times, HEX Mini offers researchers in materials science, physics and microscopy the ability to make high-quality coatings in a compact and user-friendly system, without compromising performance.

The benchtop HEX Mini can be configured with either a 2" DC (direct-current) sputtering source or a thermal evaporation source. Choice of deposition method will depend on users material, desired yield, uniformity and sample sensitivity.

Bespoke software integrated into an easy-to-use HMI allows researchers to finely tune their deposition parameters to achieve high-quality metal or TCO (transparent conductive oxide) thin films.



	HEX Mini-S	HEX Mini-T
	Turbo-pumped DC Sputtering	Turbo-pumped Thermal Evaporation
Max sample size	2" (50mm) Wafer	
Source	2" DC Sputtering	Thermal Evaporator
Power supply	208W. 650V / 0.32A	720W. 72A / 10V
Base pressure	<5x10 ⁻⁶ mbar	<5x10 ⁻⁶ mbar
Chamber volume	0.8 L	
Mass flow controller	✓	X

COMPACT DESKTOP DEPOSITION SYSTEM



HEX Mini-S





Korvus Technology has over 25 years' experience in the high and ultra-high vacuum sector. With over 250 HEX Platform systems installed worldwide, Korvus Technology remains at the forefront of the PVD industry. Korvus is now part of the Judges Scientific group, while remaining an autonomous company. This allows Korvus to remain agile to the research challenges of its customers and continue its customer focused culture.

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