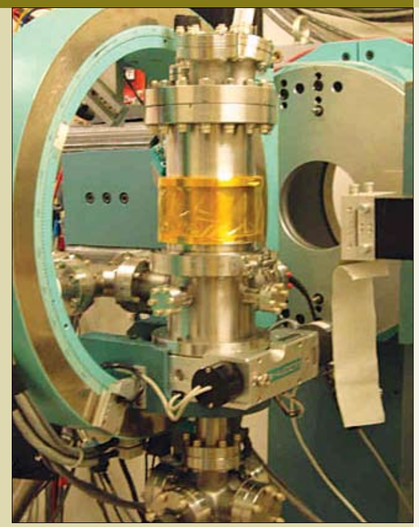
Pentacene Film Growth Instrument

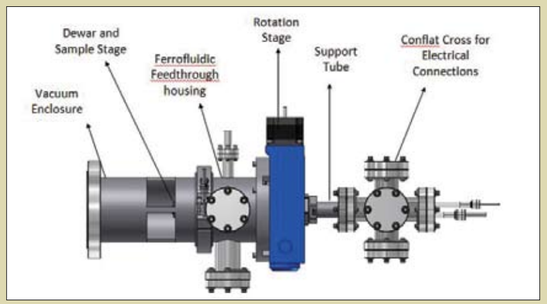
This system is a compact vacuum deposition chamber for in-situ x-ray scattering studies of organic thin film growth. The system is based on a small cylindrical chamber that can be mounted on a standard four-circle diffractometer. Incident and scattered x-rays enter and exit the chamber through a curved Be foil window that covers 200 degrees, and is sealed to the body of the chamber. The sample is mounted on a support tube with heating and cooling from >100°C to liquid nitrogen temperature. Integral to the sample stage is a multi-wire feedthrough to facilitate in-situ electrical transport characterization of organic semiconductor thin films. This is one of the novel capabilities of the system. In addition, the sample stage is mounted on a rotary vacuum feedthrough, which is mechanically coupled to the "phi" stage of the diffractometer. An effusion cell, shutter, and quartz oscillator thickness monitor are also incorporated into the system, which is pumped by a small turbomolecular pump. The system thus configured is capable of access to full reciprocal space, within the limits of the Be window. Results of initial experiments



performed at the 48-pole wiggler beamline A2, at the Cornell High Energy Synchrotron Source, show that in-situ x-ray scattering is sensitive to the early stages of nucleation and growth of organic semiconductor thin films.

PFG-110 Design Specification:

Sample heating to 200°C
Sample cooling to -173°C
3 isolated electrical connections on sample mount
Compatible for .5mm or 1.5mm thick samples
Sample mounting plate perpendicular to rotation axis within .1 degree
Sample motion/runout less than .010"
Only molybdenum parts in contact with sample
Compatible with 512 Eulerian cradle



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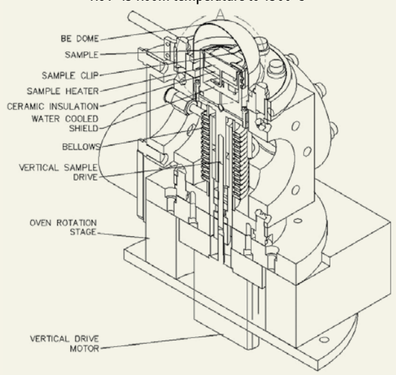
X-Ray Vacuum Oven

This easy to operate high vacuum x-ray oven provides convenient sample mounting. The system comes with a heating base, power supply, beryllium dome and standard connectors for turbo pump. The oven can be mounted on an ADC R100 rotation stage (or Huber 410) standard base. The oven is provided with a detachable sample mount with a flat circular surface 25 mm in diameter onto which the user may cement samples. This surface is 2±1 mm below the height of the center of the beryllium dome.

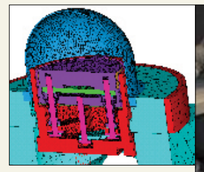
Feedthroughs provide for vacuum, gas inlet, heater power, and 2 thermocouples. The vacuum feedthrough is 18 mm in diameter for high conductance. The ovens operates over the range of room temperature to 900°C (part number XOV-35) or 1500°C (part number XOV-45), with a uniformity of 2°C and 5°C over the sample-mounting surface respectively.

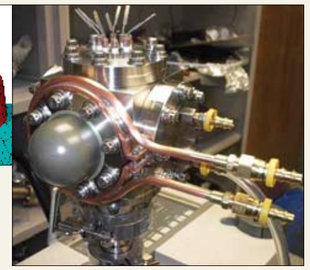
Model Numbers:
XOV-35 Room temperature to 900°C
XOV-45 Room temperature to 1500°C



A power supply is provided to control of this temperature. This power supply is controllable with a 0-10 volt DC signal and operates from a 115-Volt, 20 Amp, 60 Hz receptacle.

The sample mount maintains a fixed position (to within 0.01 mm) and orientation (to within 8 arc seconds) with respect to the Huber 410 mount as the sample temperature is varied from room temperature to 950°C and as the oven is rotated through all orientations; that is, it does not sag under its own weight beyond the specified tolerances. The temperature is measured by attaching thermocouples to the center and circumference of the 25 mm diameter sample-mounting surface. A Z-translation system is incorporated in order to move the sample for fine-tuning. It has a +/- 2 mm range.





ADC USA, Inc. is a hands-on engineering company with over 15 years of experience. We custom design devices, integrated systems and a broad array of high-precision components and instruments for commercial, academic and government agencies worldwide. Our work covers mechanical design, control instrumentation, control software, manufacturing and assembly, and installation and training.

For more information on the above systems or any of our products contact us at:

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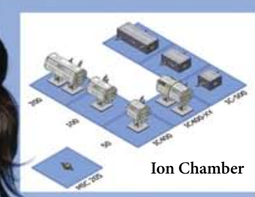
Synchrotron Experimental Equipment



Ion Chamber

Soft X-Ray Scattering Octopule End Station MAX-Lab, BESSY, APS

Pentacene Film Growth Instrument CHESS (Cornell), CLS

X-RAY Vacuum Oven CHESS, PAL, BNL, ORNL, Elettra

EQUIPMENT with REALIABLITY and DEPENDABILITY

Synchrotron Experimental Equipment

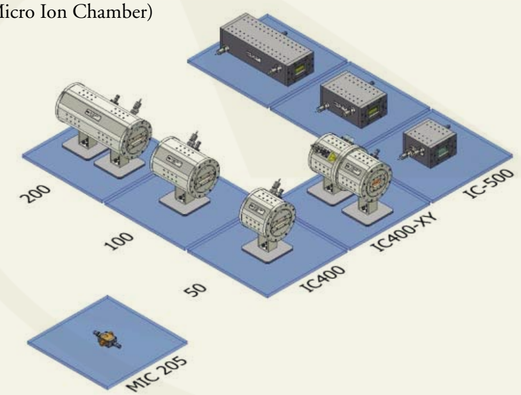
ADC offers a large assortment of synchrotron equipment used by the x-ray community including; High Precision Slits, Optical Tables, Micro Ion Chambers, Split Two Axis Ion Chambers, Spectrometers, System and many other Beamline Components. For more information on ADC's synchrotron equipment visit our web site at ***http://www.adc9001.com/products/show_list/id/114***

Ion Chamber

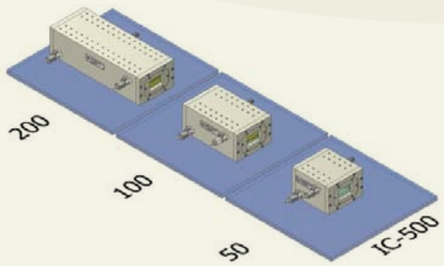
ADC offers 3 types of Ion Chambers with Beam Position Monitoring. These ion chambers have been tested at Advanced Photon Source (APS-USA) and are being used in all major synchrotron facilities around the world with excellent results for the last four years.

The three types of Ion Chambers are as follows:

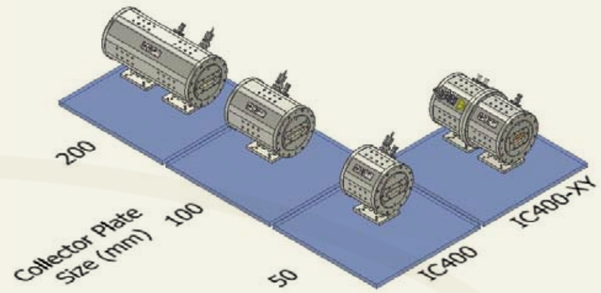
- IC-400 series (IC-400-50, IC-400-100, IC-400-200, IC-400-XY)
- IC-500 series (IC-500-50, IC-500-100, IC-500-200)
- MIC-205 (Micro Ion Chamber)



IC-400 & IC-500 series ion chambers are designed for precise, low noise x-ray measurement. The device allows users to determine the change in beam position in a single axis by comparing two signals that are created as the beam passes through the Ion Chamber. By connecting two Ion Chambers together at 90° you can determine the horizontal and vertical beam position. The system can be configured for air, vacuum, or ultrahigh vacuum operation through one of three interfaces.

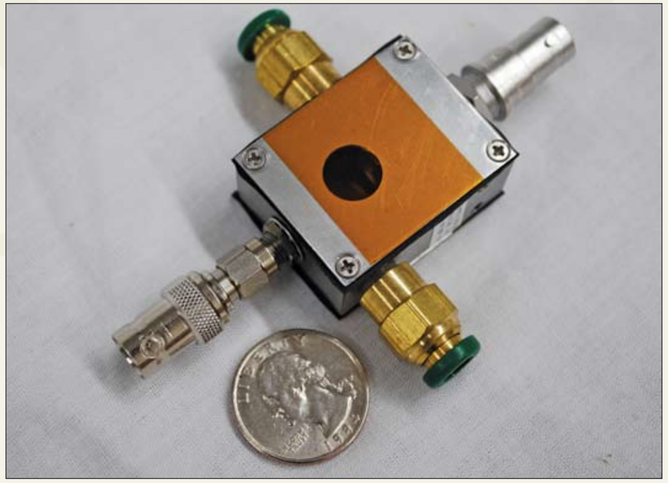


One unique feature of the **IC-400 & IC-500** series precision ion chambers is the incorporation of a split collector plate. The electrode is split in a saw tooth configuration with a height of approximately 10mm, 15mm, and 25mm such that, when the differential current is computed, allows use as a beam position monitor. Custom configuration of the window and electrode sizes is available upon request.



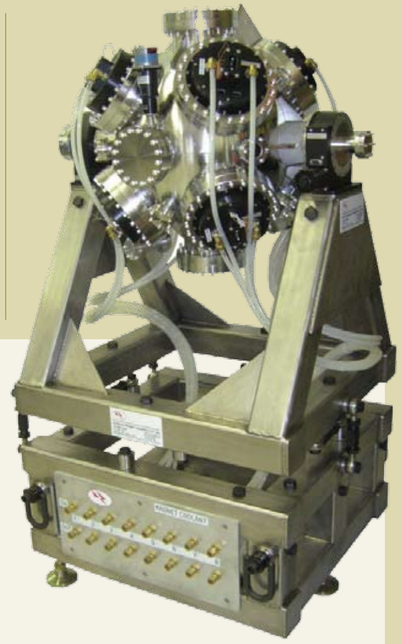
MIC-205 is a small ionization chamber detector for monitoring the intensity of hard X-ray beam. The small dimensions of the ionization chamber (20 mm along the beam direction and 30 mm perpendicular to it) make it possible to place it very close to the sample. The housing of the detector is made of stainless steel, nickel-plated copper electrodes, SHV and BNC electrical connectors, and gas connectors.

Sparking voltage is approximately 5500V under the atmospheric environment and leakage rate of gas is less than 2 torr/5 minutes under 10 torr vacuum environment.



Soft X-ray Scattering Octupole End Station

This newly developed Octupole End Station is used for Soft X-ray Scattering. This device creates a highly adaptable end station for crystallography experimentation. Eight magnets, equidistantly spaced about the surface of a sphere, create an omnidirectional field vector with a magnitude of 1 [T] and uniformity over the sample space of +/- 1%. The magnets protrude into an ultra high vacuum chamber with a base pressure of 5E-10 [mbar] that houses both the sample and detector apparatus. The entire system is then capable of rotation about the beam axis.



Technical Specification for OES-100:

Peak field magnitude of 1T
Field uniformity of 5% over 10mm cube
Field vector rotatable in free space
Integrated goniometer
UHV operation @ 5E-10mbar
Programmable power supplies with 0-60V, 0-100A
System rotatable from 0-90 degrees about beam axis
Passively damped support frame
Support frame constructed of 304SS
Optional x,y,z,theta sample manipulator
Optional load lock chamber
Optional LHe cryostat for sample cooling to 4K

Each magnet uses a tapered, partially hollowed iron core with a geometry optimized to cause saturation at the pole face. The windings use approximately 200 [m] and 400 turns of polyurethane insulated 12 AWG magnet wire. Power supplies capable of 100 [A] nominal current (120 [A] maximum) drive each magnet. Water is injected through the hollow in the iron core then travels out into the magnet cavity through a series of radial holes and channels. The compartment containing the windings is flooded to dissipate the 8-10 [kW] heat load.

The LHe cooled sample is manipulated in four axes (x,y,z,theta) with a custom manipulator attached to the exterior of the chamber allowing +/- 5 [mm] in the x and y directions, +- 50 [mm] in the z direction, and continuous rotation about the y axis. The manipulator has been designed to allow it to be rotated from the vertical to horizontal position without requiring an external support and with a minimal effect on the sample position.

A detector diode sweeps a 180 [deg] arc within the vacuum chamber about the y-axis. When coupled with the 90 [deg] rotation of the chamber and magnet system, one may examine the effect of various light polarizations without modifying the upstream optics.

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