ACCESSORIES

Options and Accessories for Asylum Research MFP-3D AFMs

Empower your research with powerful, innovative new capabilities

Go beyond topography with advanced modes and environmental control

Powerful / Versatile / Simple / Unique

OXFORD INSTRUMENTS
ASYLUM RESEARCH

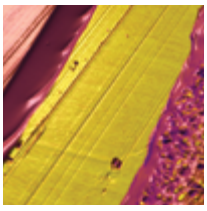
QUANTIFY

Nanomechanics and Thermal Properties

Powerful, accurate tools from the NanomechPro™ Toolkit

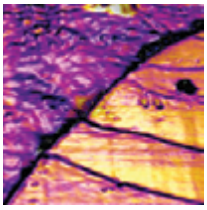
AM-FM Viscoelastic Mapping Mode

AM-FM mode combines the features and benefits of normal tapping mode with nanomechanical property mapping. Normal tapping mode provides non-invasive, high-resolution topographical imaging while the resonance of the second mode is analyzed to quantitatively estimate both the elastic and loss moduli of the material and the tip-sample dissipation.



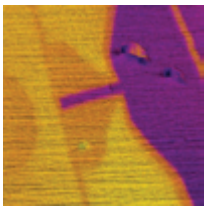
Contact Resonance Viscoelastic Mapping Mode

Asylum's exclusive Dual AC™ Resonance Tracking (DART) technology improves the sensitivity and accuracy of the contact resonance technique to enable quantitative mapping of both elasticity and viscoelastic damping for materials in the ~1GPa to 100's GPa modulus range. Asylum offers two configurations, driving either the sample or the probe, for wide-band, frequency-independent actuation.



Scanning Thermal Microscopy (SThM)

Novel microfabricated silicon probes and the SThM probe holder enable both single point and mapping measurements of temperature and thermal conductivity with higher resolution than conventional Wollaston-wire probes.

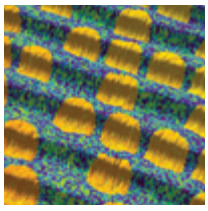


Electronic Response of Materials

Leading tools for characterizing nanoscale electrical responses

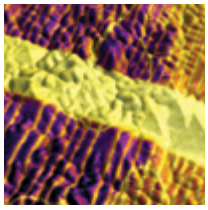
ORCA Conductive AFM

ORCA™ provides conductive AFM imaging and I-V measurement capabilities. The standard module is capable of measuring currents from ~1pA to 20nA. Other current ranges and Dual Gain versions are available.



High Voltage Piezoresponse Force Microscopy (PFM)

The Piezo Force Module enables operation at high tip biases up to ±220V for very high sensitivity and crosstalk-free measurements on piezoelectrics, including ferroelectrics and multiferroics.

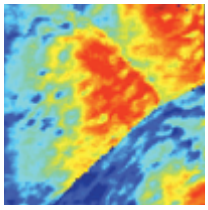


Electrochemical Strain Microscopy (ESM)

ESM is a novel scanning probe microscopy technique that is capable of probing electrochemical reactivity and ionic flows in solids with unprecedented resolution.

Scanning Tunneling Microscopy (STM)

STM can be useful for high resolution imaging of conductive samples in air and provides complimentary information to AFM images.



Electrochemistry Cell

The Electrochemistry Cell enables *in situ* studies of deposition, oxidation, corrosion, and mass transfer of metals and other materials. The cell can be operated in a fully sealed configuration and may be equipped for heating up to 60°C.

Nanoscale Time Dependent Dielectric Breakdown (NanoTDDB)

NanoTDDB™ enables characterization of dielectric breakdown with nanoscale precision. Constant or ramped biases up to ±220V can be applied while monitoring current through a conductive AFM probe.

Scanning Microwave Impedance Microscopy (sMIM)

sMIM enables nanoscale permittivity and conductivity mapping on metals, semiconductors and insulators.

HOT. COLD. DRY.

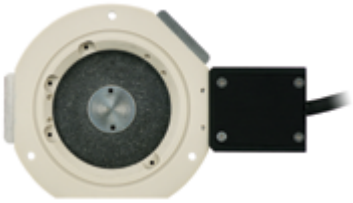
Controlling Temperature and Environment

Comprehensive solutions for controlling the measurement environment

Environmental Controller

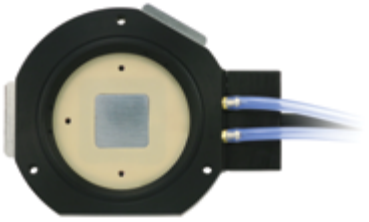
The Environmental Controller interfaces with the BioHeater™, PolyHeater™, CoolerHeater, Petri Dish Heater, and Humidity Sensing Cell to provide unprecedented precision and accuracy. The Environmental Controller is sold separately but works with multiple accessories using the SmartStart™ interface to auto-configure each for easy plug and play operation.

PolyHeater



The PolyHeater is a modular heating stage designed for high temperature polymer studies from ambient to 300°C in air or a controlled gas environment. It supports samples up to 20mm in diameter. It is also available as the **PolyHeater+** for temperatures up to 400°C. A special version is available for the MFP-3D Origin that heats from ambient to 275°C and includes a standalone programmable controller.

CoolerHeater



The CoolerHeater uses a Peltier element to heat and cool samples. Temperature can be continuously controlled from -30°C to +120°C. The system includes a coolant pump for work below 0°C. It supports samples up to 15mm in diameter. The kit includes various sample accessories, as well as a membrane and clamp for sealed operation.

Humidity Sensing Cell

The Humidity Sensing Cell measures humidity conditions with a sensor located within a sealed sample cell. The cell supports samples up to 30mm in diameter. In addition, a moat that surrounds the sample with a salt solution allows for humidity control. The kit includes various sample accessories, as well as a membrane and clamp for sealed operation.

Turnkey Glovebox

Operate your MFP-3D in a turnkey glovebox for the most demanding environmental control under low oxygen and low water (sub-ppm) conditions. Our fully integrated glovebox solutions are engineered to deliver maximum usability and performance. Contact us regarding configurations and availability

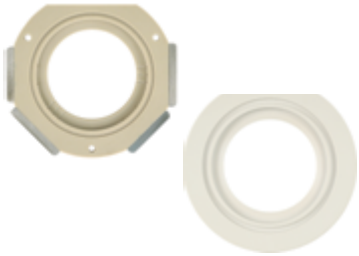
Compatible with High Voltage Option

Operating in Liquid Environments

Safe, simple, effective accessories for measuring samples in liquid

Closed Fluid Cell

The Closed Fluid Cell is designed to hold gases or liquids either statically or with perfusion through configurable inlet/outlet ports. The unique design enables the cell, sample, and cantilever holder to be fully assembled and sealed in a controlled environment (e.g. glovebox or hood) and then transferred to the AFM for use. Two related versions are available: 1) the "**Fluid Cell Lite**" that has no inlet/outlet ports and minimizes evaporation but is not completely sealed, and 2) the "**Electrical Closed Cell**," which enables electrical connections to the sample.

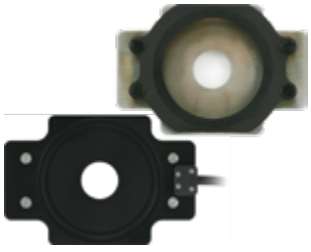


BioHeater

The BioHeater adds temperature control to the fluid exchange capabilities of the Closed Fluid Cell, allowing imaging in fluid between ambient and 80°C. It supports samples up to 25mm in diameter. The kit includes various sample accessories and spare parts, as well as a membrane and clamp for sealed operation.

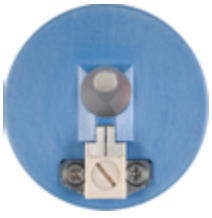
Petri Dish Heater and Petri Dish Holder

The Petri Dish Heater enables heating temperature-sensitive biological samples, specifically living cells, at physiologically-relevant temperatures ranging from ambient to 45°C. The kit includes an assortment of Petri dishes, a membrane that minimizes evaporation, and a magnetic clamp to secure the dish to the sample plate. The Petri Dish Holder is a basic, non-heating version.



MicroFlow Cell

The MicroFlow Cell is similar to the standard MFP-3D cantilever holder but includes fluid exchange ports which can be used to exchange the liquid in a small volume around the probe.



EXTREME

Subjecting Samples to Other Driving Forces

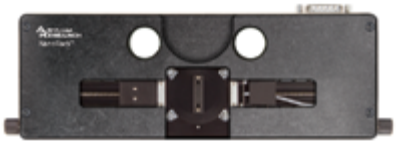
The most innovative tools for exerting a wide range of conditions

Variable Field Module 4

The Variable Field Module 4 (VFM4) is ideal for magnetic force microscopy and other applications where the sample has a dependence on the applied magnetic field. The VFM3 can apply adjustable in-plane magnetic fields of more than 8,000 G for in-plane and out-of-plane magnetic fields of more than 1,200 G. Unlike competing designs, it uses permanent magnets to avoid heating and associated drift.

NanoRack Sample Stretching Stage

Extract new information from your samples with the NanoRack™. This unique manual sample stage applies symmetric tensile or compressive loading to samples about a central area that can be simultaneously observed with the AFM. The stage features a large range to achieve high strains and an integrated load cell to measure high stresses with forces up to 80N.

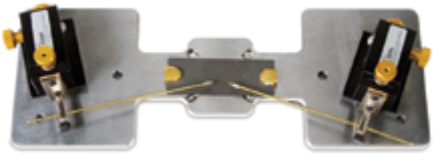


High Voltage Option and Kits

These optional packages allow high voltage (±220V) to be applied between the tip and sample. Each package includes a high voltage amplifier and additional accessories for your specific application. Compatible with the Closed Fluid Cell, Variable Field Module 3, PolyHeater, Humidity Sensing Cell, and CoolerHeater

Probe Station

The Probe Station attaches to the MFP-3D scanner and allows easy electrical probing of samples, electrical biasing, and other measurements while the sample is being scanned with the AFM. A variety of electrical connections can be made and combined with various imaging modes.



"AR's MFP-3D works great for us, not just its superior quality and capabilities on PFM, but the MFP-3D also has unique capabilities on CAFM, KPFM, MFM, as well as numerous accessories such as for controlling temperature, sample environment and high voltage. I have found the machine is easy to learn, to operate and maintain. The Asylum Research technical support is also great; we always can get our problems solved very quickly."

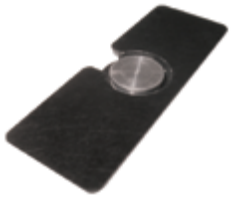
- Kaiyang Zeng, National University of Singapore

Adapting to Your Experimental Needs

Additional options to make the MFP-3D work for you

Sample Mounts

A variety of sample mounts are available in addition to the standard magnetic mount and clip mount. These include mounts for SEM stubs and coverslips. See our Sample Mounts datasheet for a complete list.



Vacuum Chuck

The Vacuum Chuck allows flat samples to be held without any mechanical contacts to the top surface and with no adhesives on the bottom surface. The Vacuum Chuck has three rings to which vacuum can be routed to accommodate 3" or 4" wafers, or sample sizes between 0.8" and 3." Note: Some regions of the wafers are not accessible.

Digital Access Module and Extended Digital Interface Module

The Digital Access Module provides digital I/O to the controller for applications such as photon counting and synchronization to the AFM scan. The Extended Digital Interface Module also provides additional programmable TTL outputs.

Extended Z Head

The Extended Z Head provides 40µm of Z range for imaging tall samples and long-range force measurements, with very minimal degradation of imaging performance (atomic resolution is still achievable).

High Bandwidth Photodiode Option

The High Bandwidth Photodiode Option upgrades vertical and horizontal signal detection bandwidth to >5MHz. The high bandwidth signal is available on two coaxial connectors for external measurement.

MFP-3D Leg Extenders

The MFP-3D Leg Extenders raise the scan head to allow imaging of thicker samples up to 30mm in height (inquire about thicker samples).

SUMMARY

Availability of Options and Accessories

The MFP-3D AFM family includes the MFP-3D Origin and Origin+ and the MFP-3D BIO

Nanomechanical and Thermal Modes
- AM-FM Viscoelastic Mapping Mode
- Contact Resonance Mode
- Scanning Thermal Microscopy (SThM)

Temperature and Environmental Control
- PolyHeater
- CoolerHeater
- Humidity Sensing Cell
- Turnkey Glovebox (inquire for details)

External Driving Forces
- Variable Field Module 4
- NanoRack Sample Stretching Stage
- High Voltage Option and Kits
- Probe Station

Electrical Modes, Electrochemistry, STM
- ORCA Conductive AFM (CAFM)
- High Voltage Piezoresponse Microscopy (HV PFM)
- Electrochemistry Cell (with heating)
- Electrochemistry Cell (without heating)
- Electrochemical Strain Microscopy (ESM)
- Scanning Tunneling Microscopy (STM)
- Nanoscale Time Dependent Dielectric Breakdown

Samples in Liquid Environments
- Closed Fluid Cell
- Fluid Cell Lite
- Electrical Closed Cell
- BioHeater
- Petri Dish Holder
- Petri Dish Heater
- MicroFlow Cell

Miscellaneous
- Sample Mounts
- Vacuum Chuck
- Digital Access Module
- Extended Digital Interface Module
- Extended Z Range Head
- High Bandwidth Photodiode Option
- MFP-3D Leg Extenders

- Compatible with all MFP-3D family AFMs
- Compatible with all MFP-3D family AFMs except the MFP-3D Origin
- Compatible with all MFP-3D family AFMs except the MFP-3D Origin (Also requires the Environmental Controller)

Need Probes?

Asylum Research sells a full range of AFM probes for every application including its own exclusive probes and supplies along with Olympus, SmartTip, NANOSENSORS,™ NanoTool, NanoWorld, Adama Innovations, and Rocky Mountain probes. Order at: **AFM.oxinst.com/probes**

Visit **AFM.oxinst.com** for more information

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