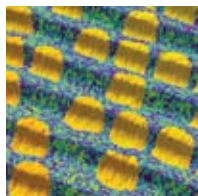


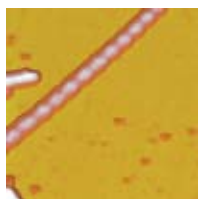
# Options and Accessories for the MFP-3D™ AFM

## Advanced Applications Options



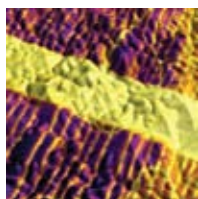
### *ORCA™ Conductive AFM Option*

ORCA provides conductive AFM imaging and IV measurement capabilities. The standard module is capable of measuring currents from ~1pA to 20nA. Other modules for different current ranges are available upon request. The kit includes a sample mount and accessories. Also available in Dual Gain version.



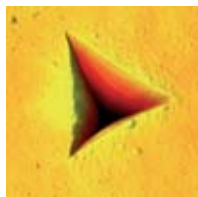
### *iDrive™ Fluid Imaging Option*

The iDrive cantilever holder simplifies imaging in fluid, especially for soft samples. The amplitude of mechanical resonance peaks normally associated with fluid imaging are eliminated which allows for easy auto-tuning of the cantilever in fluid for AC, Dual AC™ and Phase Imaging. The kit includes a variety of accessories and 105 iDrive cantilevers.



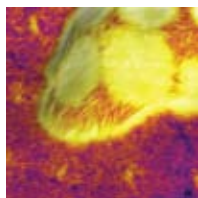
### *High Voltage Option for Piezoresponse Force Microscopy (PFM)*

The Piezo Force Module enables PFM for very high sensitivity, high bias, and cross-talk-free measurements on piezoelectrics, including ferroelectrics and multiferroics, as well as for biological systems in fluid. The module includes the HV220 Amplifier, high voltage cantilever holder, and high voltage sample mount.



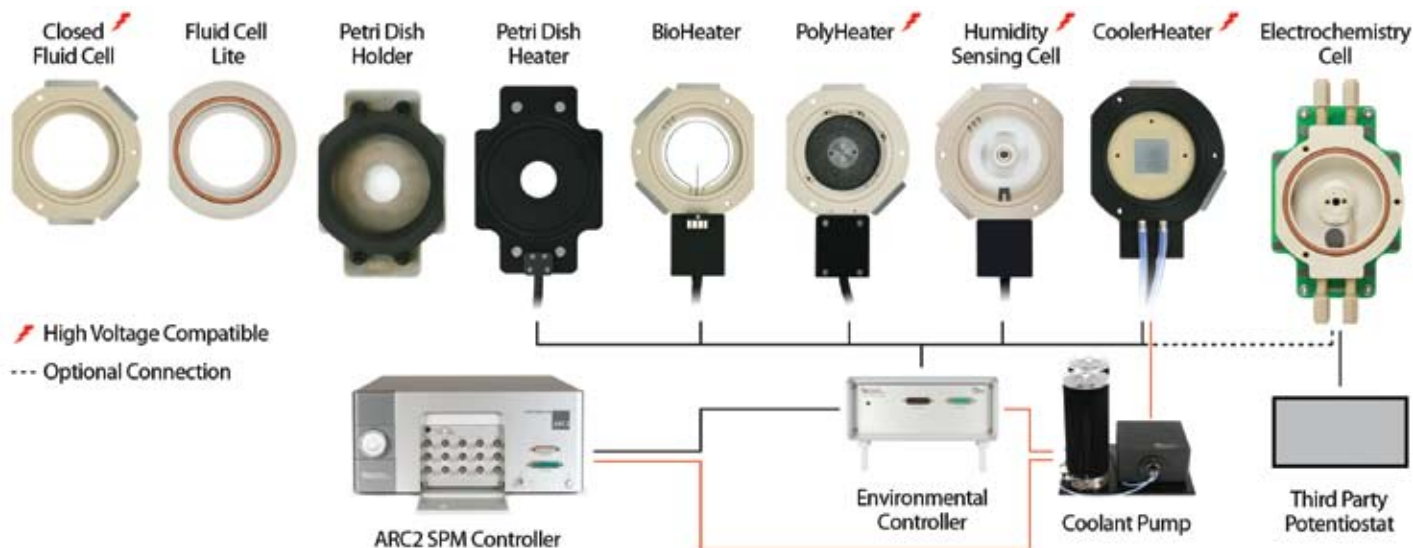
### *NanoIndenter*

The MFP NanoIndenter is a true instrumented nanoindenter, allowing quantitative measurements with unprecedented Z-sensed accuracy. The nanoindenting head allows optical side viewing of the indenting tip. Two models are available: Standard (spring constant of 2,000-3,500N/m) and Low Force (spring constant of 300-800N/m). See the MFP NanoIndenter data sheet or ask us about available configurations.



### *Ztherm™ Modulated Thermal Analysis Option*

Ztherm combines powerful conventional and new advanced thermal analysis capabilities with the high resolution of AFM, and adds patent pending compensation for thermally-induced cantilever bending and measurement of contact stiffness and dissipation for the highest sensitivity and resolution available. The Ztherm Option provides highly localized heating with sensitivity to  $\leq 10^{-22}$  liter (sub-zeptoliter) materials property changes, more than an order of magnitude improvement in volume over that previously available with commercial systems.



## Environmental Accessories

### *Environmental Controller*

The Environmental Controller interfaces with the BioHeater, PolyHeater, CoolerHeater, Petri Dish Heater and Humidity Sensing Cell. Closed loop operation ensures unprecedented precision and accuracy. The SmartStart™ interface autoconfigures each accessory for easy plug and play operation.



### *Closed Fluid Cell*

The Closed Fluid Cell provides a sealed chamber with ten inlet and outlet ports for the exchange of liquid or gas media in an otherwise sealed environment. The kit includes various sample accessories, as well as a membrane and clamp for sealed operation.



### *Fluid Cell Lite*

The Fluid Cell Lite is an economical, portless version of the Closed Fluid Cell. It is ideal for multi-user facilities where each user can have their own fluid dish. The kit includes various sample accessories and a membrane that minimizes sample evaporation.



### *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. Requires Environmental Controller (sold separately).





### *PolyHeater™*

The PolyHeater is a modular heating stage designed specifically for high temperature polymer studies from ambient to 300°C in air or a controllable gaseous environment. It supports samples up to 20mm in diameter. The kit includes various sample accessories, as well as a membrane and clamp for sealed operation. Includes the PEEK™ cantilever holder. Requires Environmental Controller (sold separately).



### *CoolerHeater*

The CoolerHeater uses a Peltier element to heat and cool samples. Temperature can be continuously controlled from -35°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. Requires Environmental Controller (sold separately).



### *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 mount 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. Requires Environmental Controller (sold separately).



### *Electrochemistry Cell*

The Electrochemistry Cell (EC Cell) enables studies of deposition, oxidation, corrosion, and mass transfer of metals and other materials. Nanoscale topographical changes can be precisely monitored in situ as induced by electrochemical reactions. The cell provides for heating from ambient to 60°C (optional) and can be operated in a fully sealed configuration.



### *Petri Dish Holder*

The Petri Dish Holder is a specially designed sample plate for imaging biological samples, specifically cells, cultured in a Petri dish. 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 included with all MFP-3D-BIO™ Systems.



### *Petri Dish Heater*

The Petri Dish Heater is identical to the Petri Dish Holder for compatibility with the same models of Petri dishes, yet provides the additional capability of 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. Requires Environmental Controller (sold separately).

## Cantilever Holder Kits



### *Standard Cantilever Holder*

The MFP-3D standard cantilever holder is made of inert materials (PEEK and quartz) with a stainless steel clip. It supports all imaging modes including AC, Dual AC and contact mode. Compatible with both air and fluid imaging. Included with all new MFP-3D systems.



### *PEEK Cantilever Holder*

This sealed cantilever holder is made entirely of inert materials (PEEK and quartz) preventing contamination to samples imaged in fluid. It is ideal for high temperature polymer heating, and can be used for both air and liquid imaging. Supports all imaging modes including AC, Dual AC and contact mode.



### *Dual Contact Cantilever Holder*

This cantilever holder is made of PEEK with stainless steel clips and provides two independent electrical contacts at the clamping surface of the cantilever mount, both routed to the crosspoint switch for user access. AC, Dual AC and contact mode are supported for both air and liquid imaging.



### *Custom Cantilever Holder*

This cantilever holder is made of PEEK and allows users to make up to four wire connections to their custom cantilevers using a wire bonder. Cantilevers can be glued to a special magnetically-backed carrier with four gold pads for wirebonding to the cantilever and connecting larger wires to instrumentation. Carriers are semi-disposable. This cantilever holder is not intended for fluid or closed cell imaging.

## Sample Mounts

### *General*



A variety of sample mounts is available to mount samples. These include SEM mounts, cover slips, conductive sample mounts for ORCA, etc. See our Sample Mounts Data Sheet for a complete list of models.

### *Contact Resonance Sample Holder*



Contact Resonance Force Microscopy is used to excite one or more resonant vibrational modes of the AFM cantilever in contact mode. The Contact Resonance Sample Holder provides a wide-band, frequency-independent excitation of the sample, allowing material mechanical properties to be evaluated with a variety of techniques, including Asylum's exclusive Dual AC Resonance Tracking (DART) and Band Excitation methods.

### *Vacuum Chuck*



The Vacuum Chuck is a sample holder option for the MFP-3D that 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". Not all regions of 3" or 4" wafers are accessible.

## General Materials Science Options



### Variable Field Module

The Variable Field Module (VFM) is ideal for magnetic force microscopy, electronic transport measurements, and other applications where the sample has a dependence on the applied magnetic field. The VFM2 applies in-plane magnetic fields approaching  $\pm 1$  Tesla. It offers  $\sim 1$ G field resolution and includes non-magnetic beryllium copper clips for sample mounting. Compatible with high voltage capability.



### High Voltage Option and Kits

These optional packages allow high voltage ( $\pm 220$ V) to be applied between the tip and sample. Each package includes the HV220 Amplifier and additional accessories for your specific application. Compatible with Variable Field Module (VFM2), Closed Fluid Cell, PolyHeater, Humidity Sensing Cell, and CoolerHeater.



### Probe Station

The Probe Station attaches to the MFP-3D scanner and allows easy electrical probing of sample properties, 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.



### NanoRack™ Sample Stretching Stage

This high-strain, high-travel manual stretching stage provides two axis stress control of tensile loaded samples under different loads. It integrates force measurements with MFP-3D images or other measurements and returns both stress and strain data. The stage is compatible with a wide variety of imaging techniques including Phase and Dual AC for enhanced contrast of material properties, as well as Ztherm for localized thermal analysis. The height-adjustable stabilizing pillar can be removed to provide bottom access to the test sample. Sample size: 12mm wide x 6mm thick max; minimum length 41mm. Maximum load 80N.



## General System and Controller Options

### Extended Head

The Extended Head provides 40 $\mu$ m Z scan range for tall samples. Requires factory modification of MFP-3D Head.



### Digital Access Module

This four-BNC digital input/output module neatly plugs into the controller for applications such as photon counting, synchronization of user experiments to the AFM scan, or general purpose digital I/O control.



### High Bandwidth Photodiode Option

This option upgrades vertical and horizontal signal detection bandwidth to  $>5$ MHz. The high bandwidth signal is available on two coaxial connectors for external measurement.

## Imaging Accessories



### Application Kits

A variety of pre-assembled application kits are available. They contain a sample, cantilevers, and instructions for performing a particular experiment such as phase imaging of a polymer sample or imaging of DNA.



### Cantilevers

Asylum Research is an official reseller of Olympus, SmartTip, NANOSENSORS™, and NanoWorld cantilevers. We also provide our own Asylum MFM and iDrive cantilevers. See our Cantilever Price Guide for a complete list of models.



### MFP-3D Leg Extenders

The MFP-3D Leg Extenders raise the scan head to allow imaging of taller samples between 7mm and 22mm in height.

## Vibration Isolation

Contact Asylum Research or visit our website for complete specifications.

### Herzan AVI 350-S Active Vibration Isolation Table



With configurations for both the MFP-3D-BIO and Stand Alone, the AVI 350-S is capable of isolating under the most extreme vibration environments. It has a 5-20msec response time and virtually no low frequency response. Maximum load 475 to 556 lbs. depending on configuration.

### For Stand Alone Configurations

- AEK2002 Acoustic Isolation Hood (also available with air temperature control).
- TS-150 Herzan Table Stable. Active isolation begins at 0.7Hz and increases rapidly to 40dB at 10Hz. Auto-leveling capability provides ease of use. Maximum load 242 lbs.



### For Inverted Optical (MFP-3D-BIO) Configurations

- TS-140 Herzan Table Stable (not pictured). Active isolation begins at 0.7Hz and increases rapidly to 40dB at 10Hz. Maximum load 220 lbs. TS-300 also available for heavier systems.
- BCH-45 Large Acoustic Isolation Hood (also available with air temperature control).



**Ask us for the related data sheets or visit our web site for more detailed information on any of the MFP-3D options presented here.**

*BioHeater, iDrive, MFP-3D, MFP-3D-BIO, ORCA, Dual AC, NanoRack, PolyHeater, SmartStart, Variable Field Module are trademarks of Asylum Research. NANOSENSORS is a trademark of NanoWorld AG. PEEK is a trademark of Victrex. ThermaLever is a trademark of Anasys Instruments. Specifications are subject to change.*



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