

Petri Dish Holder and Heater Accessories for the MFP-3D™ AFM

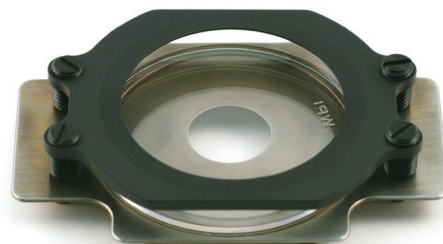
Asylum Research

Introduction

The **MFP-3D** Petri Dish accessories are ideal sample holders for mammalian cells that are cultured and imaged in Petri dishes. They are available in two configurations: the **Petri Dish Holder**, which provides a modified plate for Petri dishes, and the **Petri Dish Heater**, which provides heating to the sample from ambient to 45°C. The Heater is ideal for sensitive cell experiments that require near-native conditions. Both options accommodate a variety of Petri dish models.

Petri Dish Holder

The Petri Dish Holder is specifically designed for researchers who prefer to grow and image cells in culture dishes with minimal handling of their samples. The Holder is a modified sample plate that easily fits on the MFP-3D scanner. The kit includes a magnetic clamp to secure the dish to the plate, and a membrane to minimize evaporation. The Petri Dish Holder accepts a variety of glass-bottom and polystyrene dishes as well as typical 1" x 3" glass slides. The Petri Dish Holder comes standard with MFP-3D-BIO™ systems, and as an option for MFP-3D systems.



Petri Dish Holder pictured with a WPI Petri dish secured by the magnetic clamp.

Petri Dish Heater

The Petri Dish Heater is a version of the Petri Dish Holder which provides the additional capability of heating temperature-sensitive biological samples, specifically living cells, at physiologically-relevant temperatures ranging from ambient to 45°C.



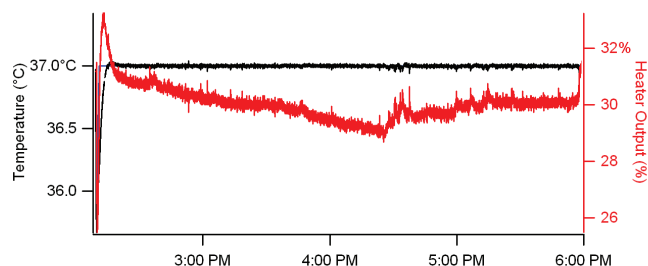
Top view of the Petri Dish Heater plate.

Environmental Controller

The Petri Dish Heater requires the Environmental Controller (sold separately), which features closed loop temperature control of the sample to within 0.05°C at steady state, with less than 0.1°C overshoot. Temperature is set from within the MFP-3D software. Sample temperature is recorded with each AFM image file and the temperature vs. time graph can be exported as text or graphic file formats.

Petri Dish Holder

- Provides open access to the cells inside the Petri dish when the head is removed.
- Includes a membrane that minimizes evaporation which fits over the magnetic clamp to form a soft seal.
- The Dish Holder and Heater are compatible with high NA objectives with the MFP-3D-BIO.
- The Dish Holder and Heater are compatible with a number of glass-bottom and polystyrene dishes, as shown in the table on next page.



Temperature vs. time graph showing sensor (sample) temperature (black line), and heater output (red line). Temperature setpoint is 37°C.



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Petri Dish Holder and Heater Accessories for the MFP-3D™ AFM

Petri Dish Heater

Same features/benefits as the Petri Dish Holder discussed above, plus:

- The temperature of the scanner top plate can be controlled from ambient to 45°C with a resolution of approximately 0.05°C. Overshoot is less than 0.1°C.
- Excellent temperature uniformity (see specifications).

Petri Dish Models

Both the Petri Dish Holder and Heater accommodate a variety of Petri dish models.



Glass-Bottom Culture Dishes (flush bottoms)	
WillCo Wells WillCo-dish™ – sterile, untreated, individually packaged	
GWSt-5030	50 x 7 mm, 30 mm dia. 0.17 mm thick glass well
GWSt-5040	50 x 7 mm, 40 mm dia. 0.17 mm thick glass well
World Precision Instruments (WPI) Fluorodish – sterile, untreated, individually packaged	
FD5040-100	50 x 7 mm, 35 mm dia. 0.17 mm thick glass well Clear wall
FD5040B-100	50 x 7 mm, 35 mm dia. 0.17 mm thick glass well Black wall
Polystyrene Culture Dishes	
BD Falcon 351006	50 x 9 mm Tight-Fit Lid Bacteriological Sterile
*Corning® 430165	35 x 10 mm Cell Culture Treated Sterile
*Corning 430166	60 x 15 mm Cell Culture Treated Sterile

*Requires vacuum grease for mounting.



Schematic of the Petri Dish Heater assembly (top). The Heater plate easily fits on the MFP-3D scanner (bottom photo).

Petri Dish Holder and Heater Accessories for the MFP-3D™ AFM

More MFP-3D Environmental Accessories

The Petri Dish Holder and Heater are just two accessories in a suite of fluid imaging environmental accessories that can be used with the MFP-3D AFM depending on your experimental needs.

Closed Fluid Cell

This accessory allows fluid imaging in a completely sealed and closed environment. The fluid cell includes ten inlet/outlet ports for fluid and gas exchange. It can also be operated in an open configuration where a soft seal membrane is used to minimize evaporation and contamination.

Fluid Cell Lite

Fluid Cell Lite is the economical choice for fluid imaging with a portless fluid dish and evaporation shield. Because there are no ports to be plugged, accidental leakage is prevented. It is ideal for multi-user facilities where each user can have their own dish.

BioHeater™

Based on the Closed Fluid Cell, this accessory allows heating fluids to 80° C in a completely sealed and closed environment. The BioHeater requires the Environmental Controller (sold separately).

See our web site for a complete list of all MFP-3D environmental accessories and additional product information.

Specifications

Petri Dish Holder

The Petri Dish Holder includes the modified holder plate and a full Accessory Kit that includes samples of select compatible petri dishes.

Bottom optical access

For use with high NA objectives

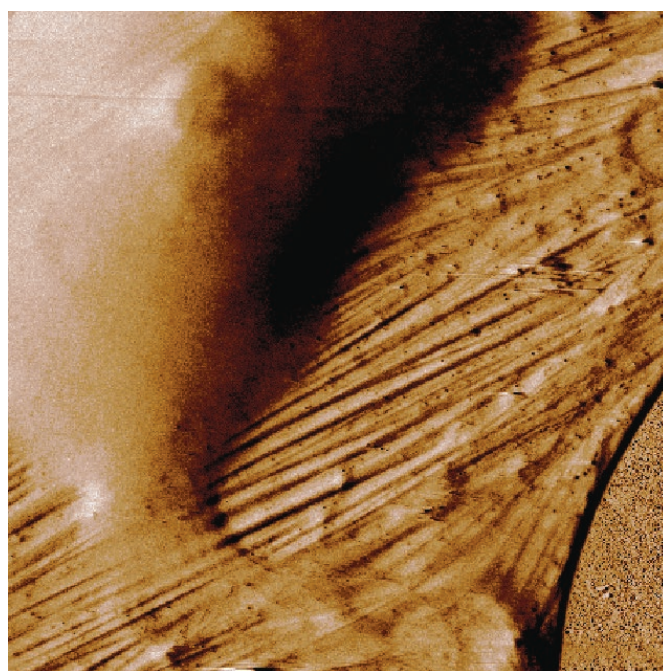
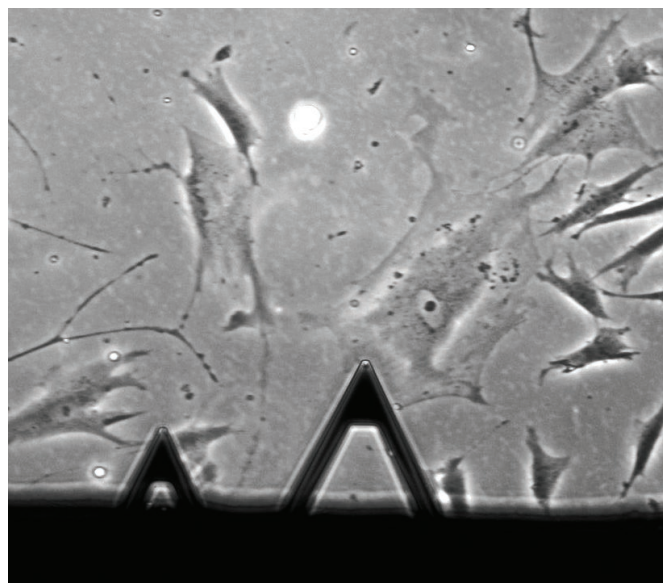
Supported sample holders (dishes, slides)

- A variety of Petri dishes (see table on page 2)
- 1" x 3" glass slides

Sample size/volume

- Liquid sample volume 1.5-2.5 cc (dish dependent)
- 10 mm maximum coarse sample translation

Compatible with all MFP-3D systems



Live MRC-5 fibroblasts. Phase contrast optical image of an AFM cantilever positioned over a cell (top) and 3D rendering of the AFM amplitude channel (bottom). The image was acquired in culture medium using AC mode, 80 μ m scan.

Petri Dish Heater

The Petri Dish Heater includes the heater plate and a full Accessory Kit that includes samples of select compatible petri dishes. Requires the Environmental Controller (purchased separately).

Same specifications as Petri Dish Holder

Temperature control

- Ambient to 45° C temperature range
- 0.05° C resolution
- 0.1° C maximum overshoot

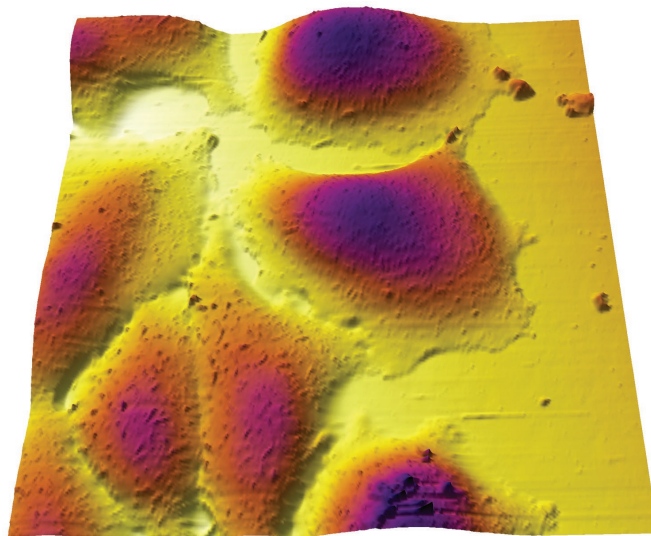
Temperature uniformity

Better than 0.1° C. Center hole is approximately 0.5° C cooler than the dish perimeter for a covered dish (dish must contain liquid to ensure temperature uniformity).

Requires Environmental Controller

Compatibility

- Compatible with all MFP-3D AFMs except MFP-3D Origin™



Fixed breast adenocarcinoma cells (MCF7 cell line) acquired in PBS using AC mode. The image is of a fairly continuous monolayer of cells. The cell margins between neighboring cells are clearly visible. 90 µm scan.

Environmental Controller

- Closed loop
- SmartStart™ for plug and play operation
- Operates at 110 or 220 VAC
- CE tested
- Built-in microprocessor for temperature control
- Fully programmable through MFP-3D software

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