FluidFM[®] probe microscopy Market leading experience in FluidFM for AFM



The established microfluidic tool for nanomanipulation and single-cell biology

FluidFM[®] probe microscope (FPM) combines the force sensitivity and positional accuracy of the Nanosurf FlexAFM with FluidFM[®] technology by Cytosurge to allow a whole range of exciting applications in single-cell biology and nanoscience.

Nanosurf has the longest experience providing AFM systems with the FluidFM® add-on, as Cytosurge's initial cooperation partner for this innovative technology - the FlexAFM with FluidFM® system was launched in 2011.

Highly accurate pressure, force, and position control with optical sample access

Add-on or fully integrated system with FluidFM[®] ARYA operator software

FluidFM[®] microfluidics control system

Available for two Nanosurf AFM platforms

Compatible with major inverted microscope brands with FlexAFM

Different FluidFM[®] probes: hollow cantilevers designed for specific applications

FluidFM® micropipettes: tipless cantilevers with opening at the cantilever end

FluidFM[®] nanopipettes: cantilevers with opening at the tip apex

FluidFM[®] syringes: cantilevers with the opening at the side of the tip

FluidFM® rapid prototyping probes: cantilevers with closed pyramidal tips, ready for FIB milling

Pioneering research within reach

A tool to conduct original research at the frontiers of science



FPM is more than AFM with hollow cantilevers. This integrated system allows higher experimental throughput and provides you with unique new possibilities in:









colloidal spectroscopy



single bacteria adhesion

single cell adhesion



single cell isolation



single cell extraction



nanolithography



Extraction of sub-picoliter sample of nucleoplasm and cytoplasm from live cells without killing them [Cell 166, 506]. Single-cell extracts were analyzed by TEM, protein assays, PCR and mass spectrometry [Anal. Chem. 89, 5017]. This illustrates the power of FluidFM to study cell processes at the singlecell level thus enabling the study of the heterogeneity of cells.



Single cell adhesion studies on human endothelial cells from the umbilical artery reveal strong intercellular forces. Left: Confluent layer of cells, where one is pulled out by FluidFM. Right: Typical single cell force curves of individual cells or cells in a confluent layer, depicting the increase in adhesion force by cell-cell interactions [Scientific Reports 7, 46152].





Compatible AFM systems

You can perform FluidFM® on different Nanosurf AFM platforms, depending on your laboratory environment, current system setup, and budget. Either use the compact CoreAFM, or the more flexible Flex-Bio AFM system, which will allow you to make full use of the inverted optical microscope.

CoreAFM with DIMO

FPM can be performed on the CoreAFM with DIMO with hardly any constraints. The digital inverted microscope option provides you with a bottom up optical view of your samples, with bright field or fluorescence contrast. This allows you to easily view cells, maneuver the cantilever, carry out single cell procedures, and observe spotting and nanolithography progress.



FlexAFM on inverted microscope

The Flex-FPM setup is the optimal choice for scientists who want the full flexibility of Nanosurf's Flex-Bio and their own inverted microscope. The Flex-FPM is available as a fully integrated system for the Zeiss Axiom, allowing you to control the AFM, pressure controller, stage and optical microscope with the user friendly Cytosurge ARYA software. The system is also compatible

with all other major inverted microscope brands, opening a wide range of combinations with optical techniques to you, including TIRF and STED.



FluidFM Micropipette Opening: 2, 4, and 8 um at cantilever end

Spring constant: 0.3 - 4 N/m



FluidFM Micropipette

Opening: 300 nm at

Spring constant: 0.6 or

tip apex

2 N/m



 $1 \, \mu m$

FluidFM rapid prototyping probe

Opening: 30 nm or more, user-defined Spring constant: 0.6 or 2 N/m

FluidFM probe on carrier clip

All FluidFM® probes come pre-mounted on a plastic carrier clip in sterile blister packs

Key publications

Tunable Single-Cell Extraction for Molecular Analyses (2016). Guillaume-Gentil et al., Cell 166, 506-516.

Bacterial adhesion force quantification by fluidic force microscopy (2015). Potthoff et al., Nanoscale 7, 4070-4079.

Force-controlled manipulation of single cells: from AFM to FluidFM (2014). Guillaume-Gentil et al., Trends in Biotechnology 32, 381-388.

A new strategy to measure intercellular adhesion forces in mature cell-cell contacts (2017).

Sancho et al., Scientific Reports 7: 46152.

Extending the limits of direct force measurements: colloidal probes from sub-micron particles (2017). Helfricht et al., Nanoscale 27: 9491-9501

Pressure system specifications

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Pressure range	–800 to 1000 mbar
Pressure precision	better than 2.5% of full range
Min. output pressure step (< 0 mbar)	0.1% of max negative pressure range
Min. output pressure step (> 0 mbar)	0.1% of max positive pressure range
Power consumption	< 32 W

🔭 nanosurf

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