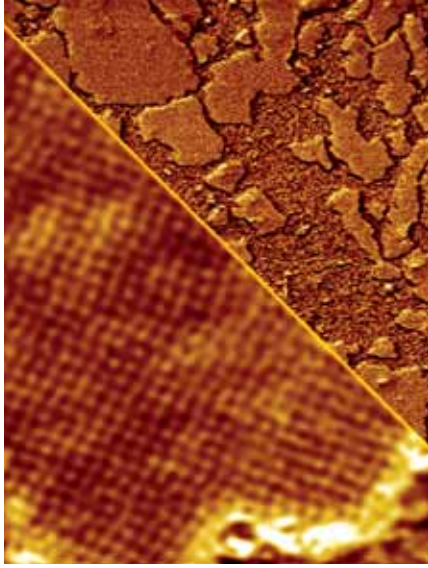

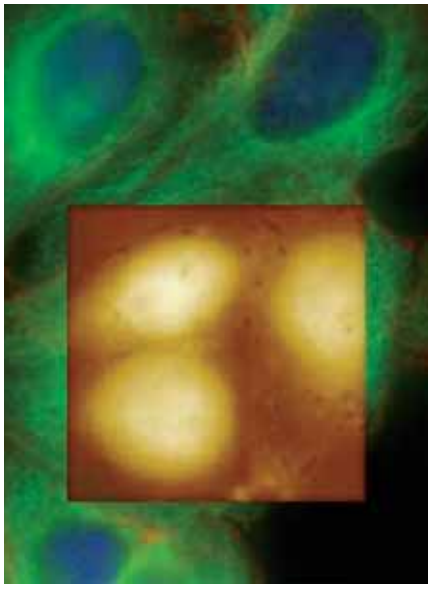

BioScope Catalyst

Life Science Atomic Force Microscope

- New Standard for AFM and Light Microscope Integration
- Uncompromised Performance from Both Techniques
- Increased Productivity and Ease of Use
- Simple, Effective Solutions for Biological Samples

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think forward

BioScope Catalyst

Accelerate Discovery in Life Science Research

The best research instruments not only acquire the intended data, but actually increase productivity. Bruker's BioScope™ Catalyst™ Atomic Force Microscope (AFM) accelerates innovative research by reducing the time and effort needed to combine the proven techniques of light microscopy with the unique benefits of atomic force microscopy.

The BioScope Catalyst is the most completely integrated, easiest to use life science AFM available on the market today.

UNCOMPROMISED PERFORMANCE THROUGH INNOVATIVE DESIGN

- High-resolution imaging capability and thermally limited (PicoForce™-quality) force measurements deliver the performance you expect from the AFM leader
- Comprehensive support for most inverted microscopes, condensers, and objectives provides uncompromised optical capabilities

MOST COMPLETE INTEGRATION OF AFM AND LIGHT MICROSCOPY

- Real-time software control allows optical images to precisely guide AFM imaging and force measurements, making the AFM a natural extension of the light microscope
- Proprietary software generates correlated AFM and optical datasets and offers advanced offline processing, enabling presentation- and publication-ready images in minutes instead of hours

EASIEST TO USE AND MOST PRODUCTIVE LIFE SCIENCE AFM

- Exchanging probes and laser alignment is made easy with a convenient probe load stand and Bruker's exclusive EasyAlign™ accessory
- New "Experiment Selector" automatically configures the software for the most common modes and applications

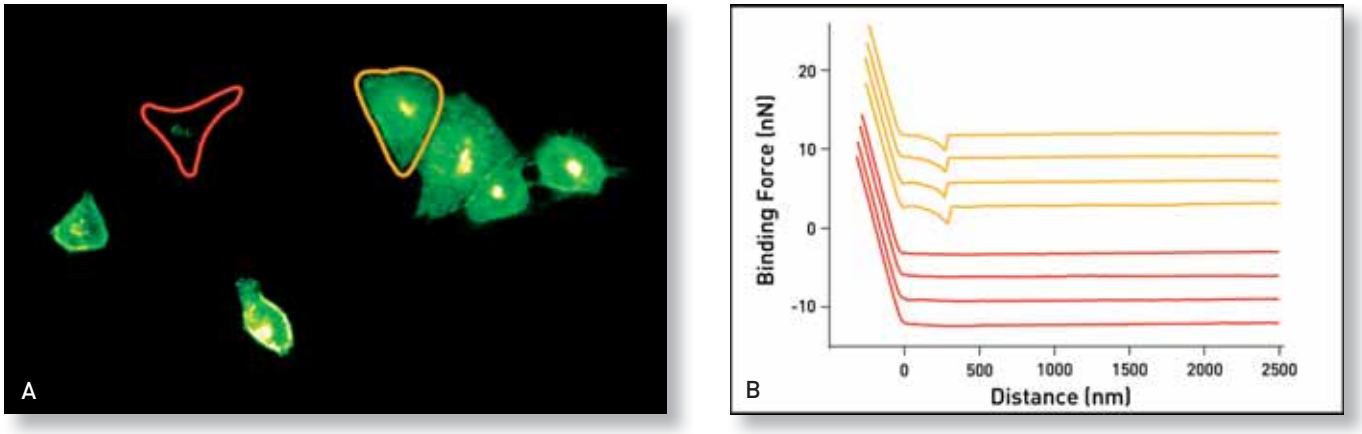
SIMPLE, EFFECTIVE SOLUTIONS FOR WORKING WITH BIOLOGICAL SAMPLES

- Easy, secure mounting accommodates all common sample substrates, including slides, cover slips, and petri dishes
- Micro-volume perfusion accessory enables applications that utilize expensive reagents, and the petri dish perfusion accessory with heating capability allows long duration live cell studies

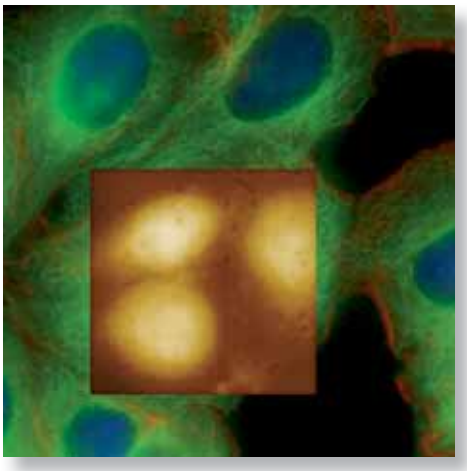
UNCOMPROMISED PERFORMANCE THROUGH INNOVATIVE DESIGN

The BioScope Catalyst provides uncompromised optical performance when mounted on most inverted light microscope models. The innovative, open design of the AFM head allows virtually unrestricted optical and physical access from above the sample. It is the only life science AFM that supports standard 0.50 to 0.55 NA condensers for the best results when using transmitted light techniques. An infrared super-luminescent diode in the AFM scan head ensures compatibility with common red-emitting fluorophores, enabling advanced optical techniques, such as epifluorescence, confocal laser scanning microscopy, TIRF, FRAP, and FRET.

As you would expect from the world's leading AFM manufacturer, the Catalyst also provides exceptional AFM performance. The unique 150-micron scan range and large 20-micron Z range deliver high-resolution, molecular-scale imaging while also accommodating much larger samples, such as living cells. Cantilever deflection is measured using a top-down laser path that simplifies laser alignment and produces thermally-limited, PicoForce-quality force measurements.



HeLa cells were transfected to express a fluorescent membrane protein. (A) Fluorescence intensity varied from strong (yellow circled cell) to faint (red circled cell), corresponding to varying degrees of protein expression. (B) Force measurements performed with functionalized AFM probes showed a strong correlation between binding force and fluorescence intensity, with bright cells yielding many binding events (yellow curves) and dimmer cells yielding very few (red curves). Data courtesy of Frank Lafont and Joêlle Warein, Institut Pasteur de Lille, France.



Fluorescence image of labeled HeLa cells from which MIRO was used to guide AFM imaging (center, 35µm). Note the strong correlation between DAPI labeled nuclei and the tallest regions of the AFM topography data. Data courtesy of Alexandre Berquand, Andreas Holloschi, and Petra Kioshis, FachHochschule Mannheim, Germany.

MOST COMPLETE INTEGRATION OF AFM AND LIGHT MICROSCOPY

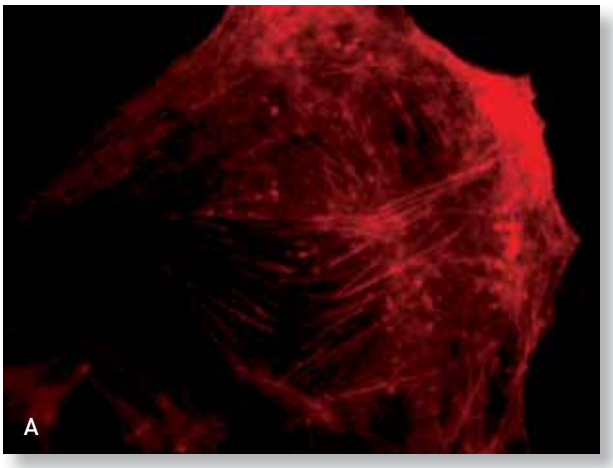
Bruker's exclusive MIRO (Microscope Image Registration and Overlay) software makes the AFM a natural extension of the light microscope by using optical images to guide AFM imaging and force measurements to targeted regions of interest. Unlike with manual registration methods, it is now possible to accurately register optical and AFM images in real time even when there are no obvious common features. In addition, enhanced support is included for Andor iXon^{EM}, Hamamatsu ORCA and Photometrics CoolSNAP cameras, which allows images to be captured directly into the software. MIRO also includes powerful offline features for creating correlated optical and AFM datasets. Finally, multiple images can be overlaid on one another and their colors, opacities, and positions can be easily adjusted.

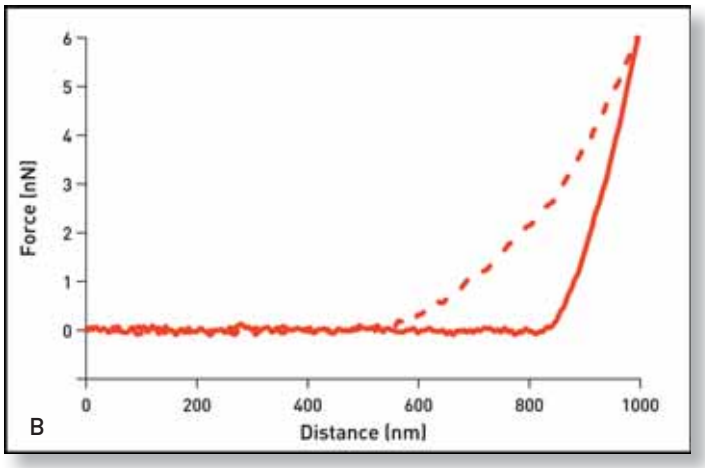
EASIEST TO USE AND MOST PRODUCTIVE LIFE SCIENCE AFM

Every facet of the BioScope Catalyst, from its integrated hardware design to its software interface, is designed to allow researchers to concentrate on their experiments rather than on the details of AFM operation. Exchanging probes and laser alignment is made easy with a convenient probe load stand and Bruker's exclusive EasyAlign accessory. Operation requires no programming language skills and the NanoScope® software runs under the familiar Microsoft Windows operating system. The redesigned interface presents a straight-forward, intuitive workflow that helps guide users through typical operating modes and applications. The new "Experiment Selector" allows researchers to select from the most common modes and applications, so less time is spent configuring parameters and more time is spent acquiring data.

SIMPLE, EFFECTIVE SOLUTIONS FOR WORKING WITH BIOLOGICAL SAMPLES

The BioScope Catalyst includes sample holders for slides, cover slips, and 35, 50, and 60 millimeter petri dishes. The open-head design of the system makes it simple to add or remove fluids by pipette and provides superior visibility to the sample. A heater accessory enables samples to be maintained at physiological temperatures. A petri dish perfusion chamber enables long-term cell studies. And finally, for dynamic studies, a micro-volume (<60 microliters) perfusion cell allows quick exchange of buffers for applications such as protein binding studies that utilize precious or very expensive reagents.





A) Fluorescence image of osteosarcoma cell with labeled actin cytoskeleton network. The AFM was used to make force measurements on the cell, before and after treatment with a drug that disrupts the actin network. B) Force curves show a dramatic softening of the cell, indicated by the much more gradual increase in force on the treated cell (dotted line) compared to the untreated cell (solid line). Data courtesy of Alexandre Berquand, Andreas Holloschi, and Petra Kioshis, FachHochschule Mannheim, Germany.

ACCELERATE YOUR SUCCESS

The BioScope Catalyst Life Science AFM has been designed from top to bottom to make it easier than ever to realize the unique benefits of combining atomic force microscopy and light microscopy. With its ultimate combination of performance and ease of use, the BioScope Catalyst can help remove the obstacles to your research and speed your rate of discovery.

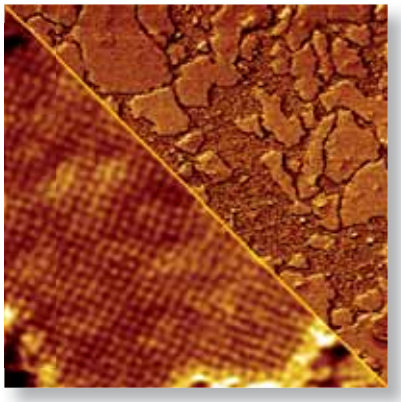
THE EVOLUTION OF THE LIFE SCIENCE AFM

Often, the key enabling factor in scientific advances comes from the intersection of separate technologies. Such is the case in life science research with the integration of atomic force microscopy and light microscopy. In 1994 the original BioScope was the first commercial AFM on an inverted optical microscope, and we have continued to work with the life science research community on product advances. The BioScope Catalyst represents a new generation of life science AFM, built upon the success of previous models and incorporating both customer feedback and the latest technological innovations to meet the advanced application needs of today and tomorrow.

The BioScope Catalyst delivers faster, more consistent imaging and the best quality, thermally limited force measurements necessary to perform:

High-Resolution, Molecular-Scale Imaging

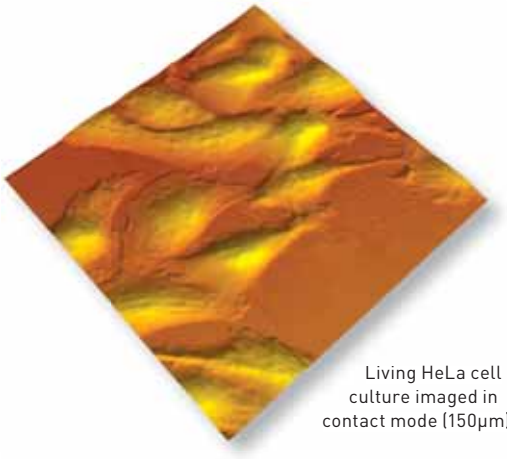
- Lipid bilayers and membranes
- DNA-plasmid and other biomolecules
- Biopolymer structure



Bacterial S-layer membranes imaged in fluid in TappingMode™. Overview scan (5µm) shows that membranes adsorb with random orientations. At higher resolution (500nm), the square lattice packing with ~14nm periodicity is evident.

Live Cell Imaging

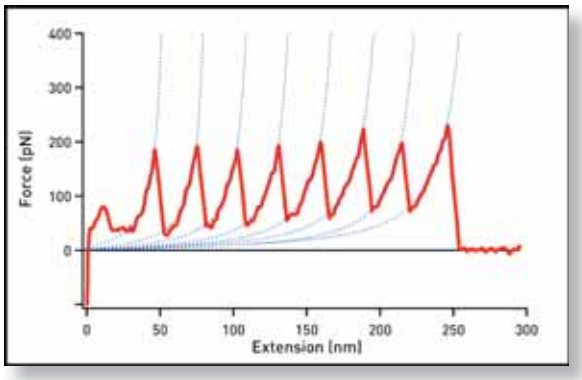
- Structure and function relationships
- Combined optical and AFM studies
- Response to environmental stimuli



Living HeLa cell culture imaged in contact mode (150µm).

Force and Mechanical Studies

- Cell membrane elasticity
- Nanomanipulation and mechanical stimulus
- Mapping ligand-receptor interactions
- Single-molecule force spectroscopy



Forced unfolding curve for a titin recombinant protein. Each sawtooth feature represents the force required to unfold a single domain.

BIOSCOPE catalyst

SPECIFICATIONS

SUPPORTED CONFIGURATIONS	
Inverted optical microscopes	Leica Microsystems DMI 3000, 4000, 6000; Zeiss Axio Observer A1, D1, Z1 (also Axiovert 100, 135, 200); Nikon Eclipse Ti-E/U/S (also TE2000-E/U/S); Olympus IX51, IX71, IX81 (also IX70); (also supports stand-alone operation)
Transmitted light condensers	Leica S28 (0.55 NA, 28mm WD); Zeiss LD (0.55 NA, 26mm WD); Nikon LWD (0.52 NA, 30mm WD); Olympus IX2-MLWCD (0.50 NA, 45mm WD); (also supports other models with longer working distances)
Confocal laser scanning microscopes	Leica TCS SP5; Zeiss LSM 5 and LSM 710; Nikon C1si and C1 plus; Olympus FluoView 300 and 1000; (inquire regarding other models)
CCD cameras	Enhanced support for Andor iXon^{EM},Hamamatsu ORCA, and Photometrics CoolSNAP cameras allows direct image acquisition through NanoScope software (inquire about compatibility of specific models); supports all other cameras through TIFF, JPEG or BMP image file import
AFM controller	NanoScope V
Computer	Intel 2.4GHz Quad Core, 4GB RAM, 500GB hard drive, DVD-RW drive; NanoScope v8 software runs under Microsoft Windows XP Pro; single 30-inch LCD display, 2560x1600 pixel resolution
AFM SPECIFICATIONS	
X-Y scan range	≥150µm, open-loop or closed-loop operation
Z scan range	≥20µm, open-loop or closed-loop operation
Deflection detection	IR super luminescent diode (SLD), λ=850nm
Height noise	<0.1nm RMS (air); <0.2nm RMS (fluid) (typical with appropriate vibration isolation)
Force noise	Thermally-limited, PicoForce-quality force measurements, <10pN RMS for cantilever with k=20pN/nm
XY sample stage	Motorized stage with 10x10mm range; includes magnetic sample clamps for 1x3in slides, 25mm coverslips, 35 and 60mm plastic petri dishes, and 50mm glass bottom petri dishes
ACCESSORIES	
MIRO software	Allows real-time import and registration of optical and AFM images; optical images can be used to guide AFM imaging or force measurements; offline features allow image overlay, adjustment of colors and opacities, and flexible data export options
Perfusion cells	Petri dish perfusion for 50mm glass-bottom petri dishes ; Micro-volume perfusion cell (<60µL cell volume)
Sample heating	Physiological temperature range imaging (up to 40°C)
Spring constant calibration	Thermal tune method built into NanoScope software
FACILITY REQUIREMENTS AND REGULATORY INFORMATION	
Vibration isolation	Vibration isolation table or integrated vibration/acoustic isolation enclosure required
Power	1800W, single-phase, 100, 120, or 240V, 50 or 60Hz, dedicated circuit
Laser classification	Class 3R, 3.9mW max at 850nm (IEC and US CDRH) 
Certification	CE

Note: Performance specifications are typical and subject to change without notice. Visit the Bruker website for most up-to-date specifications.

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