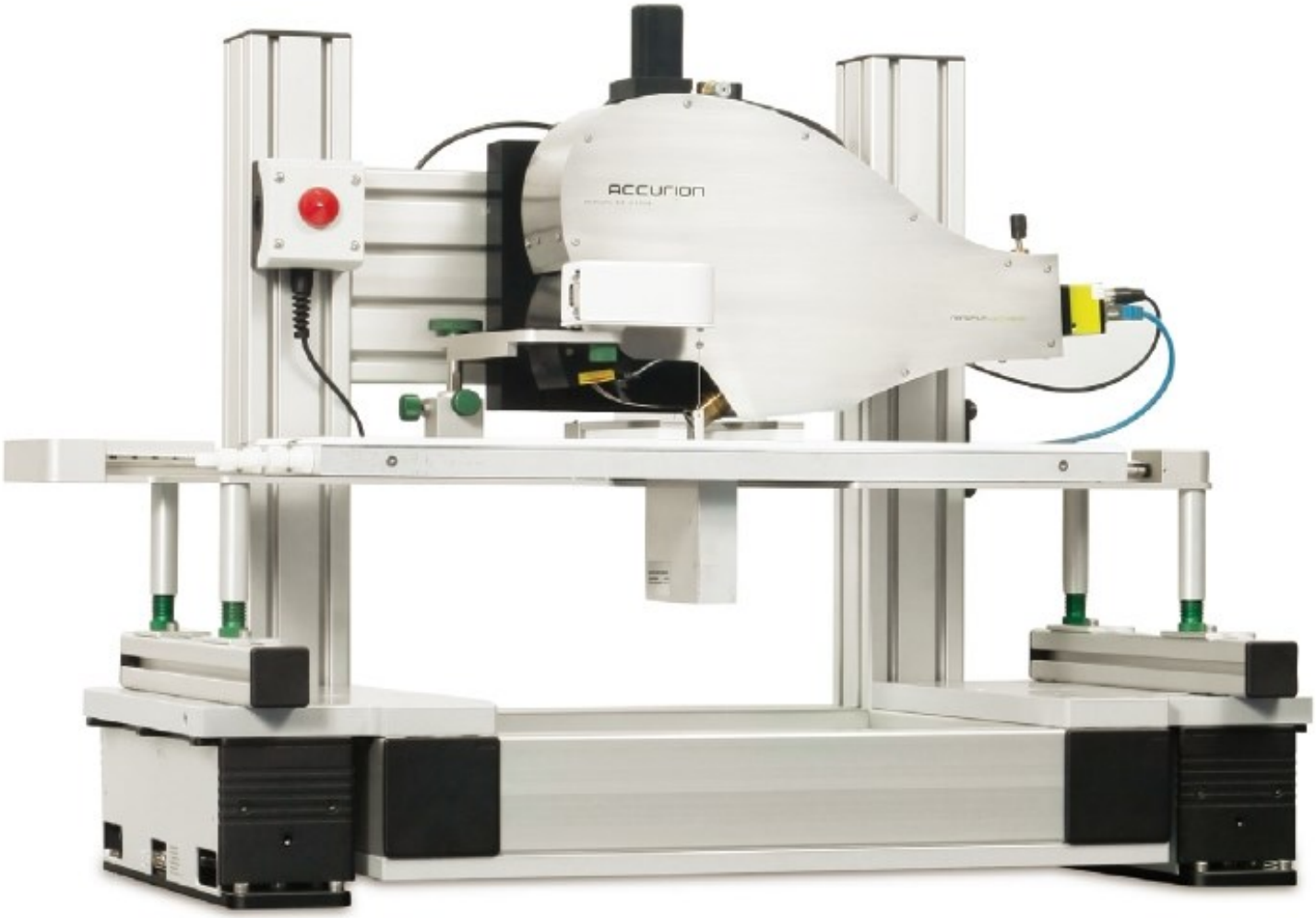
nanofilm_ultrabam

ACCURION

solutions for science

_Brewster angle microscope nanofilm_ultrabam



nanofilm_ultrabam with nanofilm_trough*large*

Brewster angle microscope nanofilm_ultrabam

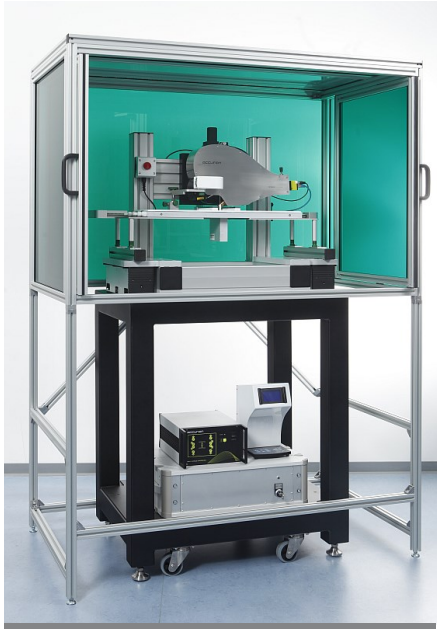
ABSTRACT

The nanofilm_ultrabam is the ultimate Brewster angle microscope designed for the air/liquid interface. It allows the direct visualization of Langmuir monolayers or adsorbate films. It also works on dielectric substrates like glass, quartz or similar materials.

The Ultrabam combines high resolution and overall focused real-time imaging. Advanced imaging optics provide fully focused images at 20-35 frames per second. A high performance camera and specific calibration algorithms enable quantitative measurements of reflectivity. Thus adsorption kinetics or thickness variations can be monitored.

The motorized analyzer offers the visualization of optical anisotropy, that is e.g. caused by long range molecular orientation order in monolayers.

The nanofilm_ultrabam is designed to match most troughs available. Regarding best performance and simple handling the nanofilm_trough*large* is recommended. Vertical position changes of the instrument head are performed by a highly precise motorized lift.



nanofilm_ultrabam with through, laser safety cabinet and support frame

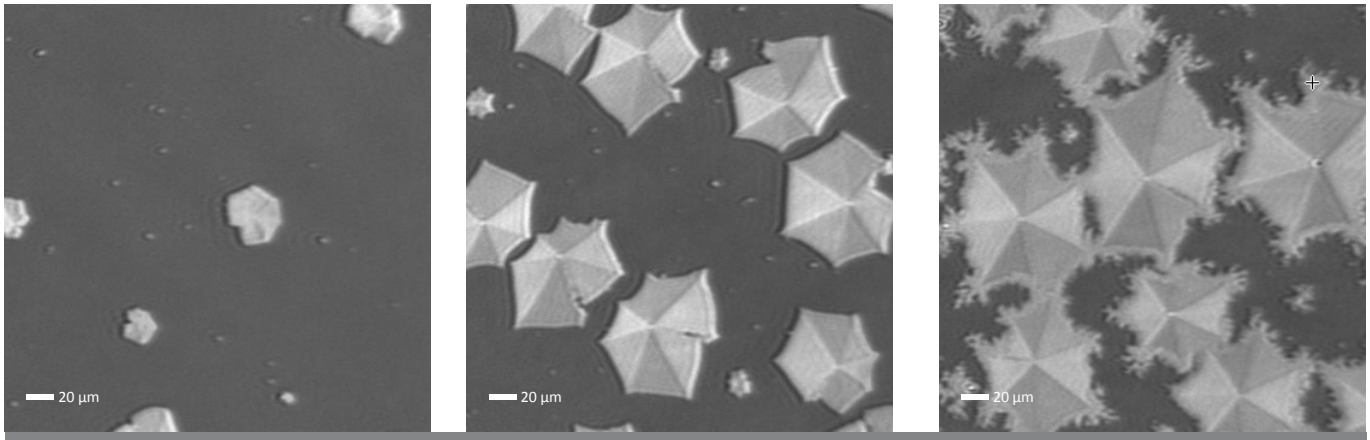
APPLICATIONS

- Domains and order phenomena
- Transformation of monolayers into multilayered structures
- Photochemical reactions (e.g. photoisomerization)
- LB-films on solid structures
- Polymers and other materials that cannot be detected by fluorescence microscopy
- Adsorption kinetics
- In-situ polymerization in monolayers
- Phase separation
- Influences of subphase compositions (counter-ions) on monolayer structures
- Quality and homogeneity of LB-films
- … and many more

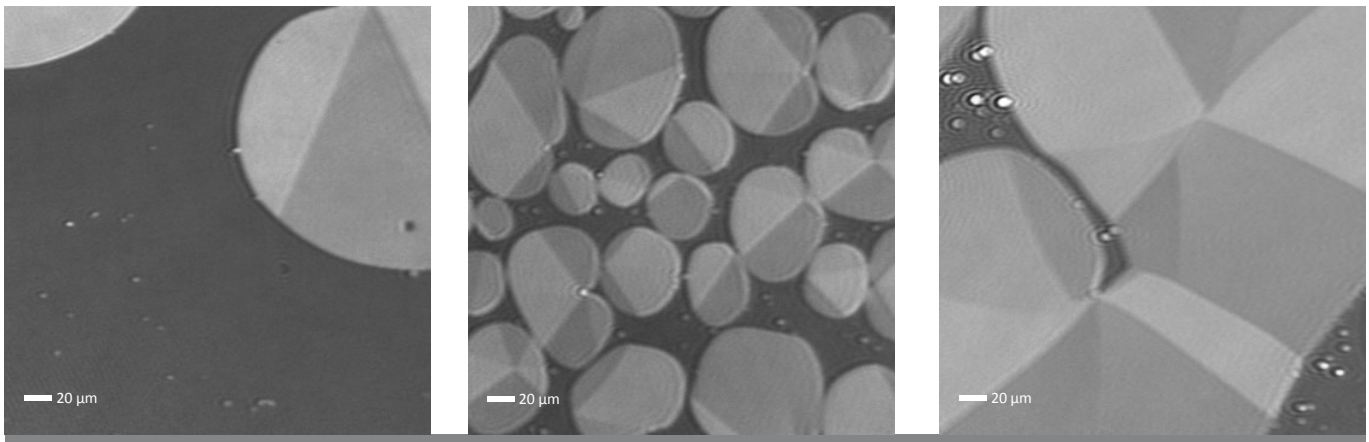
FEATURES & BENEFITS

- Real-time overall focused images without focus scanner
- Direct visualization of the sample
- Lateral resolution down to 2 microns
- Imaging of anisotropic layers
- Designed for the air/liquid interface, but also works on dielectric substrates
- Variable angle-of-incidence ranging from 52° to 57°
- Large field of view
- On-line image processing
- AVI recorder
- Software interface for major trough systems
- Image files contain trough data
- Active vibration isolation system included

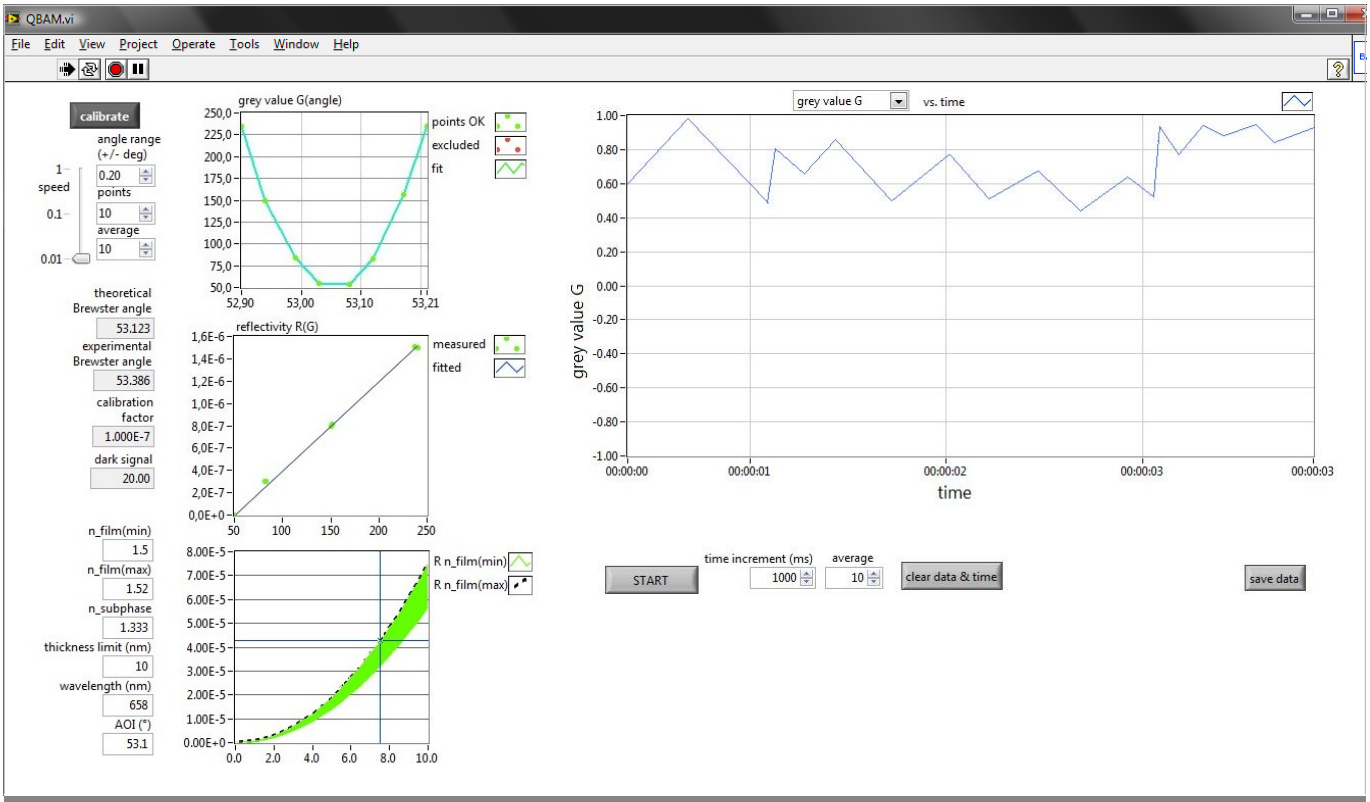
Graphical user interface of the nanofilm_ultrabam



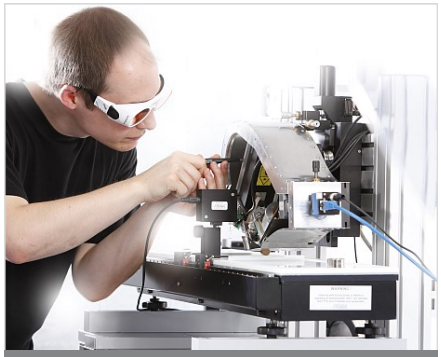
Monolayer of 2-Monopalmitoleoyl-rac-glycerol at different surface pressure (left: π = 3,06 mN/m, middle: π = 4,30 mN/m, right: π = 5,86mN/m)



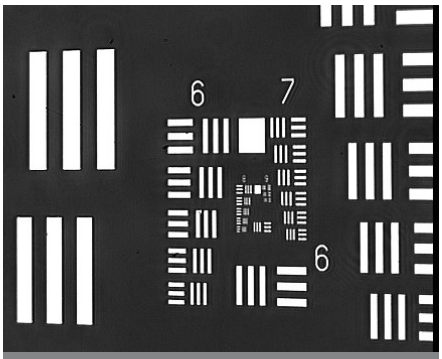
Monolayer of 1-Monopalmitoleoyl-rac-glycerol at different surface pressure (left: π = 2,68 mN/m, middle: π = 4,35 mN/m, right: π = 7,94mN/m)



QBAM tool used for quantitative Brewster angle microscopy studies

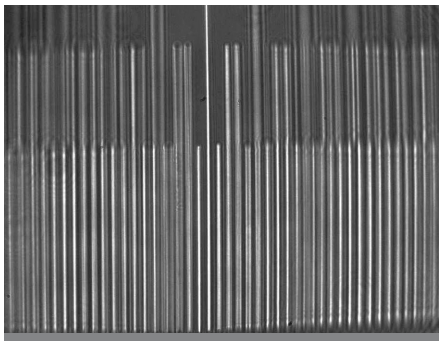


Calibration of the laser

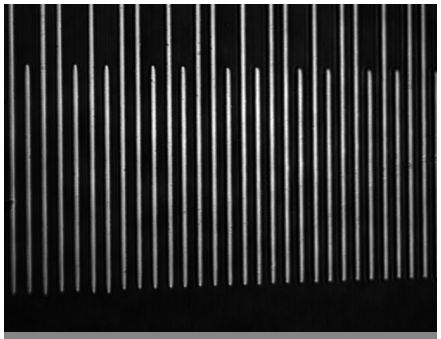


Resolution of the imaging system according to USAF 1951 test target

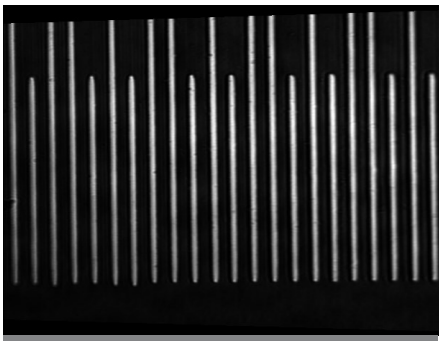
Monolayer experiment with NIMA trough



Conventional imaging system used in standard Brewster angle microscopes



Sophisticated imaging system used in Ultrabam



Geometrical correction

ACCESSORIES AND OPTIONS

- Laser safety cabinet
- Steel support frame
- nanofilm_trough
- Manual sample stage

Technical Specifications
nanofilm_ultrabam

CONFIGURATION

TYPE:	Brewster angle microscope
ANGLE-OF-INCIDENCE RANGE:	52° - 57° (equivalent to Brewster angle for substrates with n = 1.3 … 1.54), motorized, 0.001° resolution
LIGHT SOURCE:	50 mW, 658 nm class IIIb broadband laser source for reduced interference fringes (other light sources on request)
IMAGING OPTICS:	True 2 micrometers resolution (horizontal image direction) according to Rayleigh's criterion; effective resolution of the camera 0.7 µm/pixel (valid @ 53.1° AOI)
FIELD OF VIEW:	720 x 400 µm
POLARIZER:	High quality Glan-Thompson prism, motorized, 0.001° resolution
ANALYZER:	Advanced high quality thin film polarizer, motorized, 0.001° resolution
CAMERA:	High performance CCD camera, 1360 x 1024 pixels, 2 x 2 binning mode for increased sensitivity, 20 fps (max: 35 fps @ 2 x 2 binning), 12 bits, GigE interface, variable exposure time and gain
MOUNTING:	Variable vertical position of the instrument head (alternative mounting options on request). Two-axis horizontal alignment of instrument head by fine-thread screws
Z-LIFT:	Precise motorized positioning of the instrument head, range 40 mm, adjustable lower end switch for safety reasons
VIBRATION ISOLATION:	halcyonics_variobasic_40 high performance active vibration isolation system (stable support structure and solid floor are included)
IMAGE PROCESSING:	Automatic background compensation, geometric image correction for unskewed images, contrast enhancement and image filtering, images contain trough data and BAM settings, AVI video recorder, including AccurionServer environment for simple access to measurement data

ELECTRONICS

CONTROL:	nanofilm_ultrabam control software for simple access to all motorized components, camera etc.; Interface to KSVNIMA trough to import data on surface pressure etc.; Calibration routines for quantitative Brewster angle microscopy
ELECTRONICS	Based on nanofilm_ep4 electronics with embedded Linux controller
POWER SUPPLY:	100 - 240 V, 50/60 Hz
PC AND MONITOR:	Up-to-date PC with Windows 7® operating system, pre-installed software - ready to use, LCD display 23" or larger

Technical specifications may change without notice. The nanofilm_ultrabam does not include the trough shown in the pictures.

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