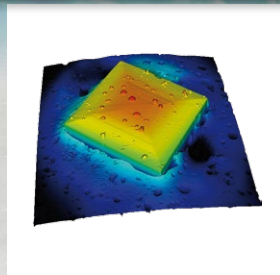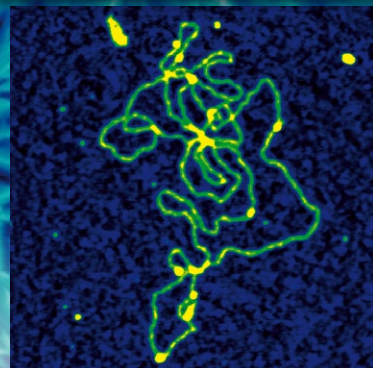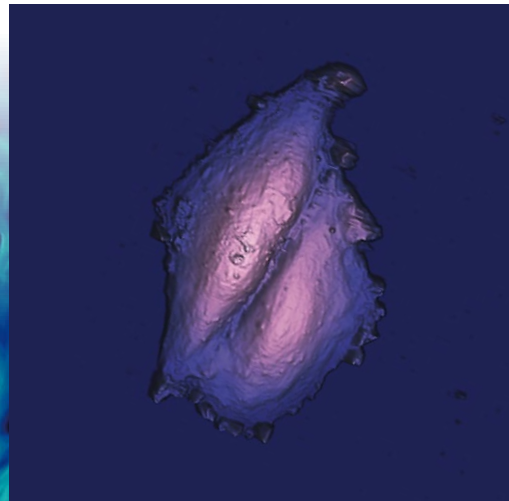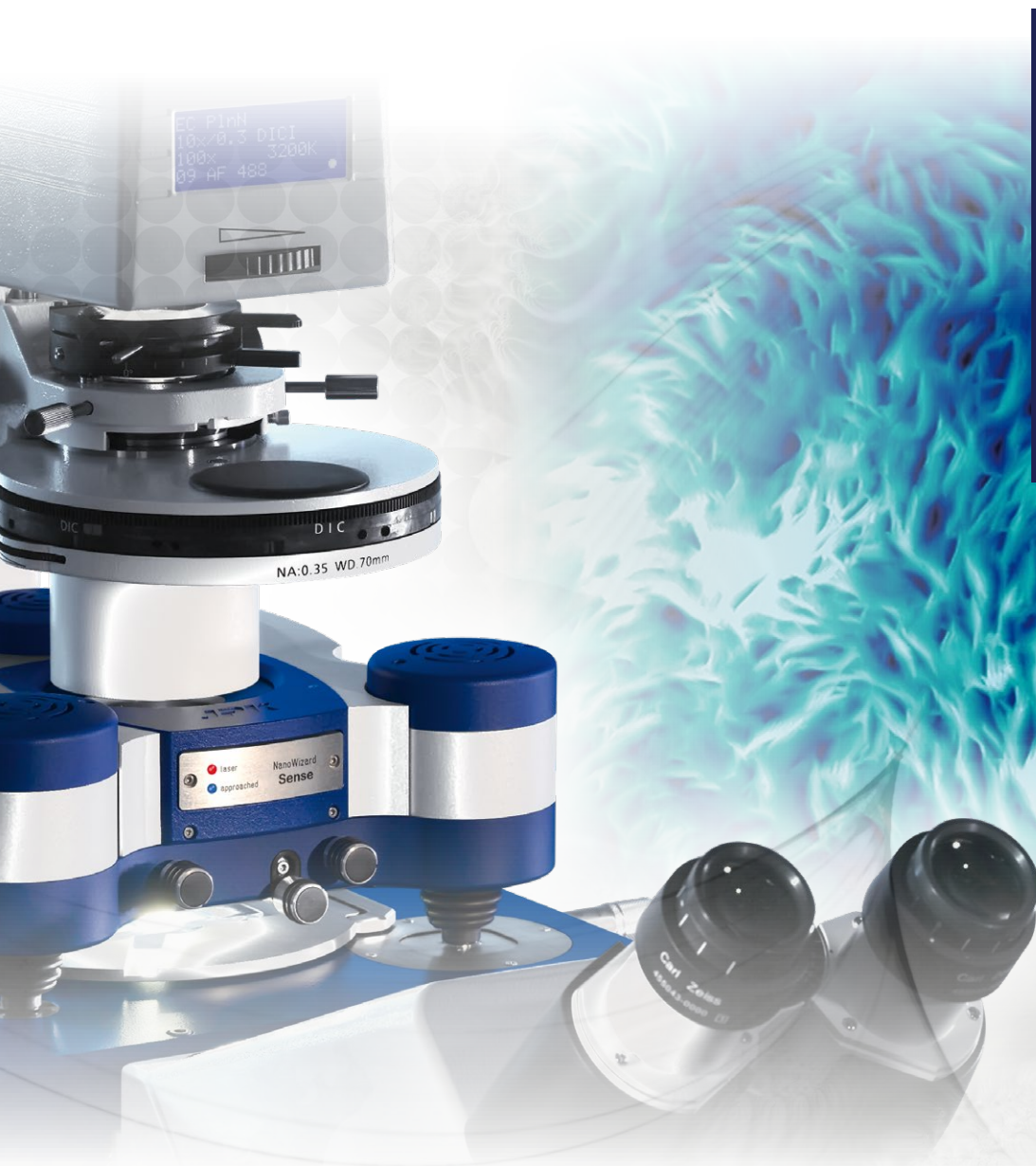Exceptional flexibility & modularity with proven NanoWizard® technology

NanoWizard® SENSE

Designed for high quality imaging in air and liquid with excellent resolution, lowest noise and maximum usability

Unique integration with optical microscopy by tip-scanning design, DirectOverlay™ mode and smart engineering

Comprehensive force measurements from single molecules to living cells

High flexibility with a broad range of modes and accessories to characterize mechanical, electrical, optical, magnetic and chemical samples properties

Can be easily upgraded to a full NanoWizard® 4 system

JPK Instruments

we have joined Bruker

BRUKER

SPECIFICATIONS FOR THE
NANOWIZARD® SENSE AFM

System specifications
- Atomic lattice resolution
- Low noise level of cantilever deflection detection system < 15 pm RMS
- Closed-loop for reproducible tip positioning and long time position stability
- Tip-scanning stand alone system, the only choice for simultaneous AFM and optical experiments
- IR deflection detection laser source with low coherence for interference-free measurements
- NanoWizard® Sense can be operated:
  1) On top of an inverted research microscope for AFM simultaneously with optical microscopy
     - Find a measurement spot optically on your sample by fluorescent labeling
     - Combine AFM with advanced optical techniques such as confocal, FCS, FRET, TIRF, STED, STORM/PALM or others
     - Exact positioning and overlay of optical and AFM data with the JPK DirectOverlay™ software module
  2) Stand-alone based
     - Maximum flexibility even if no fluorescence is needed (the sample stage can be mounted on an optical microscope within a minute)
     - Free access to the sample area for micropipettes or electrical connections
     - Optional TopViewOptics™ vertical viewing system

NanoWizard® Sense head
- Rigid low-noise design and drift-minimized mechanics
- Liquid-safe design with integrated vapor barrier, special encapsulated piezo drives and tip-moving design
- Intelligent and automated approach optional with user defined parameters for soft landing
- Transmission illumination with standard condensers for precise brightfield, DIC and phase contrast
- Built-in optical filters for fluorescence without crosstalk
- Scanner unit
  - Flexure stage scanner design with decoupled, low mass z scanner
  - $100 \times 100 \times 15\,\mu m^3$ scan range for the head

Sense SPMControl electronics
- State-of-the-art digital controller with lowest noise levels
- High speed 16 bit AD conversion with 60 MHz for the photodector signals (optional)
- High speed Lock-in amplifier technology for precise amplitude and phase detection
- Gigabit Ethernet interface for fast data link
- Number of data points that can be captured continuously: restricted only by HDD
- Thermal noise acquisition up to 2.0 MHz

SPMControl software
- True multi-user platform
- User-programmable software
- Fully automated sensitivity and spring constant calibration using thermal noise or Sader method
- Outline™ mode for precise selection of a new scan area even in the optical image
- Improved ForceWatch™ mode for force spectroscopy and imaging for cantilever-drift free measurements
- Advanced oscilloscope functionality and online measurement of distances, cross sections etc.
- Unlimited pixel resolution for imaging or force curves
- Comprehensive force measurement with TipSaver™
- Advanced spectroscopy modes such as various force clamp modes or user-defined ramp design, e.g. for temperature ramps, pulling speed or force feedback (optional)
- Powerful Data Processing (DP) functions with full functionality for data export, fitting, filtering, edge detection, 3D rendering, FFT, cross section etc.
- DataProcessing Image-Viewer for picture-in-picture display and export, including calibrated optical images
- Powerful batch processing of force curves including WLC, FJC, step-fitting and other analysis
- Image batch processing

Stages
- Automated filtering of curves without events
- Liquid-safe, robust and drift-minimized design
- Manual precision stage with $20 \times 20\,mm^2$ travel range
- Independent positioning of tip and sample with respect to the optical axis
- Stages are available for all major inverted optical microscope manufacturers

Sample holders
- Holders for Petri dishes, coverslips, microscope slides, metal SPM stubs, etc.
- Special holders and liquid cells possible
- $\varnothing 140 \times 18\,mm^3$ free sample volume

Optical configurations
- Fits to inverted microscopes from
  - Zeiss (Axio Observer, AxioVert 200, Axio Vert.A1)
  - Olympus (IX line)
  - Nikon (TE 2000, Ti)
  - Leica (DMi line)
- Fully simultaneous operation with optical phase contrast and DIC, using standard condensers
- Compatible with commercial confocal microscopes and fluorescence techniques such as TIRF, FRET, FCS, FRAP, FLIM, spinning disk, PALM, STORM, STED
- AFM and upright high-NA optics combination with the JPK BioMAT™ workstation (see BioMat™ brochure)
- Large variety of high-end EM-CCD cameras supported
- TopViewOptics™ video optics for opaque samples
- Upright Fluorescence Microscope (UFM) Kit for co-localization experiments on opaque substrates

Temperature control options
- RT - 300°C temperature range with 0.1°C precision with the JPK High Temperature Heating Stage (HTHS™)
- -35°C - 120°C temperature range with 0.1°C precision with the JPK Heating Cooling Module (HCM™)
- All heaters and heating/cooling solutions are software-controlled

Fluid cell options
- Inert glass standard cantilever holders for experiments in droplets or custom fluid cells
- JPK´s patented BioCell™ for high-NA immersion lenses and high resolution AFM down to the single molecule level
  - allow temperature control between 15 - 60°C,
  - perfusion and gas flow
  - for standard cover slips
- JPK CoverslipHolder offers the same capability as the BioCell™ for ambient temperature experiments
- JPK's temperature controlled electrochemistry cell ECCell™ with transmission illumination
- JPK's PetriDishHeater™ perfect for living cells
  - accommodates 35 mm Petri dishes even with coverslip bottom
  - ambient to 60°C temperature range
  - perfusion and gas flow possible
- JPK SmallCell™ small volume version for aqueous solutions
  - Closed fluid cell for minimized volumes (< 60 µl)
  - 3 easily accessible sample ports, 2 for buffer exchange and 1 for adding chemical reagents

Options (see accessories brochure)
- Motorized precision stage with $20 \times 20\,mm^2$ travel range with joystick or software control
- Different sample holders, cantilever holders and stages for every application
- Large choice of add-ons such as temperature controls and liquid cells even for aggressive solvents
- JPK´s ForceWheel™ handheld accessory for most sensitive experiment control
- CellHesion® module with extra 100 µm closed loop z range
- Cameras and light sources for video imaging or fluorescence
- Vibration and acoustic isolation from leading suppliers
- Upgrade to NanoWizard® 4

STANDARD OPERATING MODES

Imaging modes (air or liquid)
- Contact mode with Lateral Force (LFM)
- AC modes with Q-control
- Phase detection

Force spectroscopy (air or liquid)
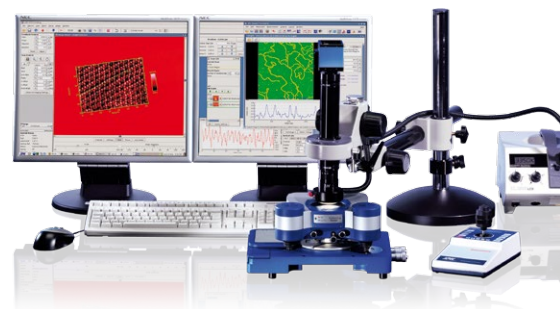- Static and dynamic spectroscopy and mapping

OPTIONAL MODES
- QI™ and QI™ Advanced mode for quantitative imaging of mechanical, electrical and magnetic properties (see QI™ brochure)
- MFM
- EFM
- Conductive AFM
- STM
- Piezo-Response Force Microscopy
- Electrical spectroscopy modes
- Electrochemistry with temperature control and optics
- NanoLithography and NanoManipulation
- JPK ExperimentControl™ for remote control
- JPK ExperimentPlanner™ for designing a dedicated measurement workflow
- JPK RampDesigner™ for custom designed force curve segments
- NanoIndentation
- Scanning Thermal AFM
- Environmental control
- DirectOverlay™ for combined AFM and optics
- Additional z stage available with CellHesion® module

NanoWizard, CellHesion, TAO, BioMAT, NanoTracker, ForceRobot, Vortis, DirectOverlay, HyperDrive, RampDesigner, QI, Experiment-Planner and ExperimentControl are trademarks or registered trademarks of Bruker Nano GmbH.

Cover images
- Top: SOAS living cell, 3D image
- Middle: DNA in buffer on mica
- Bottom: Zeolite in liquid, atomic steps

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