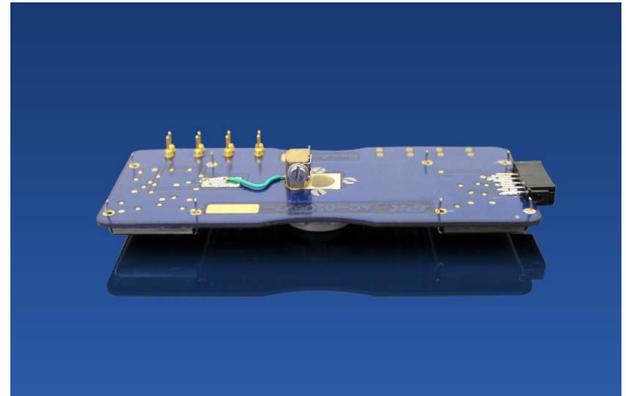


## Scanning Tunneling Microscopy (STM) Module for the NanoWizard®3 head

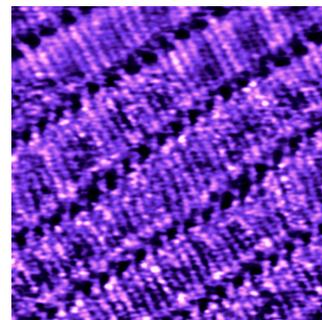
### Highest performance and lowest noise level

STM as the earliest member of the scanning probe microscopy family is routinely used to investigate the topography and electronic properties of molecules or nanometer sized objects on flat, conductive substrates within excellent spatial resolution which takes advantage of the extreme distance dependency of the tunnel-current flowing between probe and sample.

JPK's new *STM module* as an extension of the NanoWizard® 3 head delivers outstanding sensitivity of the tunnel-current in combination with superior spatial resolution. A tailor-made *electrical sample connection module* accommodates electrical ly conductive samples such as SPM metal stubs by magnetic fixation or transparent samples such as ITO coated glass. With a new grounding concept and intelligent signal conditioning, the system reaches lowest noise levels of 0.55pA. The STM operation is possible in open or closed loop scanning mode. Since NanoWizard® 3 is equipped with the lowest noise capacitive sensors the user can reach sub- nm resolution in closed-loop mode.

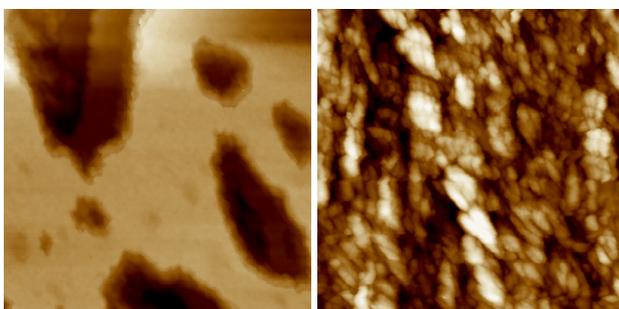


STM Module



Monolayer of arachidic acide on HOPG  
(current, 10 x 10 nm)

### Perfect usability



STM topography of template stripped gold (upper) and ITO (lower), 1µm x 1µm

The STM module can be operated with the NanoWizard®3 head either in stand-alone configuration or on top of an inverted, research- grade, optical microscope. In the stand-alone configuration the STM module can be used in combination with the JPK TopViewOptics™ to allow an optical overview of the sample and navigate the STM probe to the region of interest. On transparent substrates like ITO the combination with a high magnification, inverted optical microscope allows the investigation of the optical response of the sample (quantum dots etc.) on an electric stimulus or vice versa with single photon sensitivity.

The STM-probe holder with the integrated current amplifier circuit comes with an intelligent and easy to set-up automatic sample biasing. This ensures the shortest electrical connection to sample and tip for lowest electronic noise. The tip holder is optimized for 0.25 and 0.5 mm wire STM-probes. To make the tip exchange quick and easy, the operator can use an optimized probe exchange tool.

### Powerful and flexible software

With the new SPMControl v4 software the operation becomes remarkably easy. From standard imaging in constant current / height mode with high frame rates up to Scanning tunneling Spectroscopy experiments (STS,  $I(U)$ ,  $I(z)$ ); the software gives full control over all experiment parameters for customized, non-standard experiments in a clearly structured graphical user interface.



*Combined STM and optics: NanoWizard® 3 equipped with STM-Module on Zeiss inverted optical microscope*

### Benefits

- High resolution imaging of conducting surfaces / adsorbates
- Easy upgrade of existing NanoWizard® 3 systems
- Allows STM and inverted optical microscopy simultaneously
- Imaging and point spectroscopy (STM and STS)
- High current sensitivities / lowest noise levels
- Top-view optical capabilities

### System specifications

#### Hardware

- Noise level
  - 0,55 pA RMS
- Switchable Gain
  - 10 nA/V or 1 nA/V
- Current Range
  - +/- 100nA or +/- 10nA
- Bias Voltage range
  - +/-10V
- STM probes
  - 0.25 or 0.5 mm wire

#### Software control

- Easy-to-use Java based graphical user interface
- Advanced spectroscopy modes ( $I/V$ ,  $I/z$ , etc.)

#### Additional information

- CE compliant