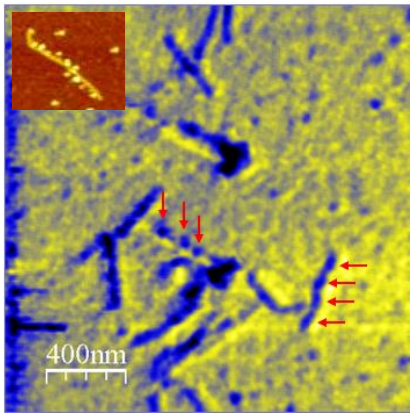
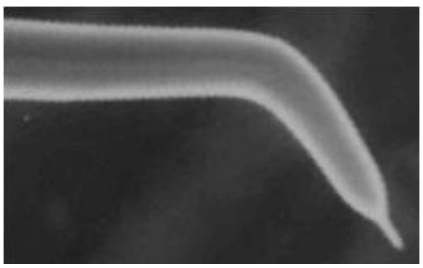



*NSOM Imaging of DNA Decorated with 3 nm Q-dots (Inset: On-line Multiprobe AFM With A 5 nm Supersensor Probe)*



*Broad Band IR Active NSOM Source for nanoFTIR Imaging*

# NSOM & ANSOM From The Visible To IR

*From The Near-field Pioneers*

A New World of
NanoImaging of Electromagnetic Radiation
With Spectral NanoImaging
of Electronic, Vibrational
& Librational Properties of Matter

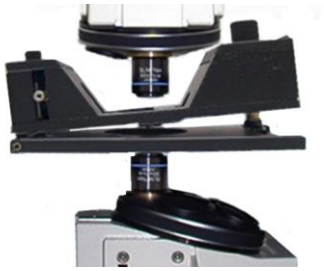
NANONICS IMAGING Ltd.

*The Next Evolution In Near-field NanoCharacterization™*

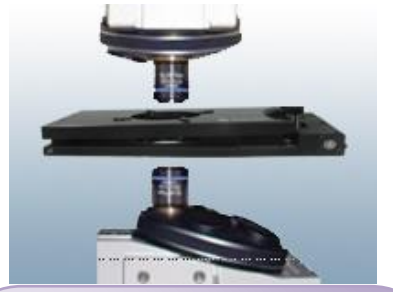
# A Variety Of Platforms All Seamlessly Integrated With Optics & SPM

## *From The Pioneers of The Near-field*

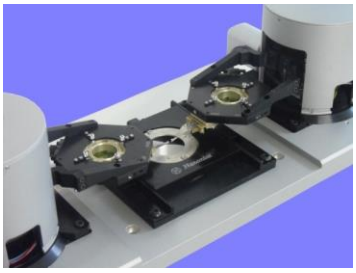
Nanonics Imaging Ltd platforms were designed from the bottom up for the ultimate in near-field optics with full integration with all optical, fluorescence, Raman, Infrared, Non-linear & Electron/Ion Beam microscopes. Thus, these open platforms have allowed for new horizons in near-field optics that provide for background free nanoscale imaging across the entire electromagnetic spectrum. A critical component of this integrated concept has been not only pioneering system geometries, such as AFM scanners with ultra large Z range compatible with confocal & SEM, background free *normal force* tuning fork feedback, completely free optical axes etc but also the view, over the last two decades, that the probe is a critical component for achieving such exceptional nano optical imaging. Thus, Nanonics pioneered both passive and active near-field probe design that is transparent to integrate & readily allows Nanonics' pioneering development of MultiProbe imaging.



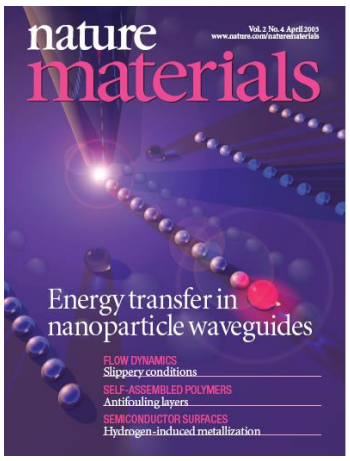
**MuliView 1000**
**First Completely Free Optical Axis With Probe Placement Independent of The Microscope Optical Axis Critical To The Publication Below**



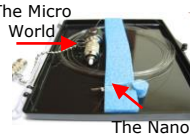
**MuliView 2000**
**First Probe & Sample Scanning System with Normal Force, Background Free, Tuning Fork Feedback Allowing for Nanometric Sample Positioning Even Relative To an Electron Beam While Feely Scanning The Probe For Near-field Imaging. The Example Below is of Cathodoluminescence & Shown is a Collage of Topography With 70 nm Resolution Near-field Optical Distribution Below**

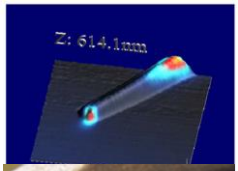


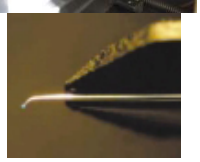
**MuliView 4000**
**First Multiprobe SPM**
**In The Example Below One NSOM Probe Acts As An Effective Excitation Source For Plasmons While A Second Probe Images The Optical Distribution Below**



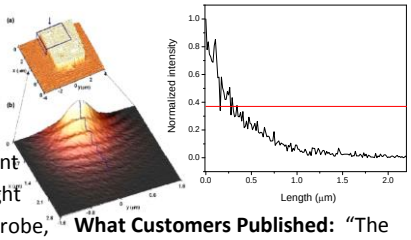

**What customers published**: "To probe energy transport directly in the fabricated Plasmon waveguides, local excitation is necessary as opposed to far-field excitation of all particles in the arrays. To accomplish this, the tip of an illumination mode near-field scanning optical microscope (NSOM) (Nanonics NSOM-100) is used as a local excitation source for nanoparticles in plasmon waveguides." [Nature Materials 2, 229 - 232 (**2003**)]



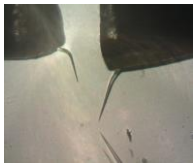



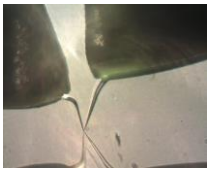



**What Customers Published**: "The electron beam is incident in a fixed location and the light is collected through a fiber probe, operating simultaneously as the tip for atomic force microscopy (topography) and near-field optical collection. The unique open architecture of the MultiView 2000 is critical to the ability to scan the collecting probe, while keeping an independent generation source fixed at a point of interest on the sample. High voltage piezo drivers are used to control the upper and lower stages as well as the probe in three dimensions." [Physica B 404, 4933 (2009)]




**What Customers Published:** "The illumination probe approached the waveguide and the position of this probe was determined by first using this probe as an AFM tip and acquiring an image of the sample and then locking it in the desired place. . . . .. A similar NSOM probe was scanned above the sample in collection mode to measure the field intensity associated with the radiative decay of the propagating SPP wave, was finally collected onto a photomultiplier tube" [Appl. Phys. Lett. 94, 243118 (2009)]
The perfection of the experiment is benefited from the use of the NSOM probe to excite the sample in the near field. This point SPPs source can be used in many areas for its high coherence, deterministic position, and minimum requirement for the initial light source." [Applied Physics Letters 98, 201113 (2011)]





## Nanonics NSOM Systems Allow For Pioneering Directions In Near-field Optics

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info@nanonics.co.il

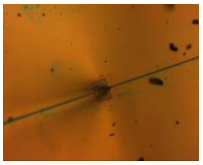
# Complex Imaging Tasks Implemented With A Combination of Nanonics Pioneering MultiProbe Systems & NanoToolKit™ of Unique Optically & MultiProbe Friendly Probes

Illumination

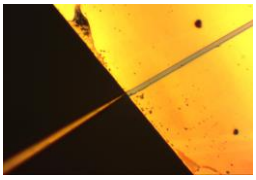
Viewing or Illuminating or Collecting From The Top Bottom or Both

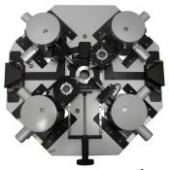
Side Injection of Light With Nanonics Lensed Fiber & Integrated NanoManipulators

Collection

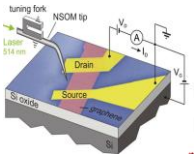


Simultaneous NSOM Imaging From The Top or The Side



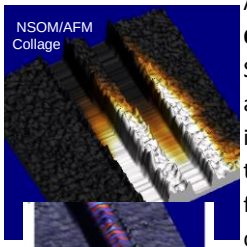


Upto 4 Probes

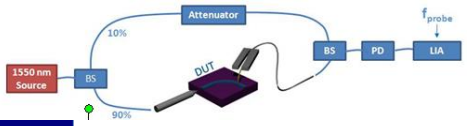


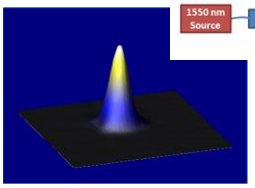

Nanometric Near-field Photocurrent & Photovoltage

Amplitude & Phase

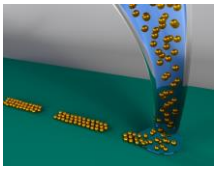


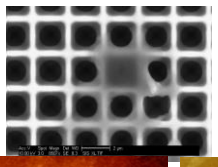

Monitoring From the Top Near-field Amplitude (Top) and Phase (Below) **OPTICS EXPRESS 19, 12014 (2011)** Which States: "The NSOM probe is modulated at a frequency fprobe around 40 KHz, which is the characteristic eiqen-frequency of the tuning fork of the tip. Such a relatively low frequency component can be detected and demodulated with relative ease "



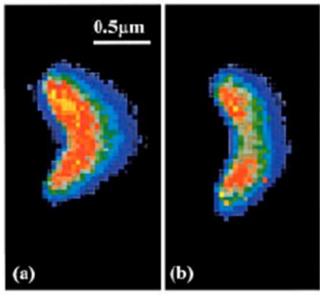



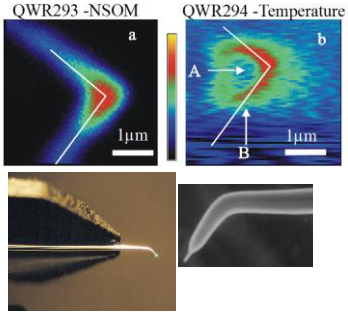
Profiling From The Side While Simultaneously Injecting With A NanoFountain Pen Probe To Alter On-line A Photonic Bandgap

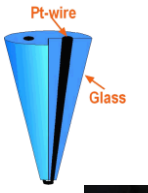




Spectrally Selective Near-field Imaging of Mode Structure Quantum Wire Laser at 805 (a) & 805.8 nm (b) Extreme [Left] & Simultaneous MultiProbe Optical Distribution & Thermal Imaging [Right]

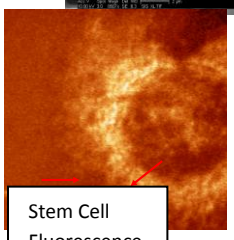


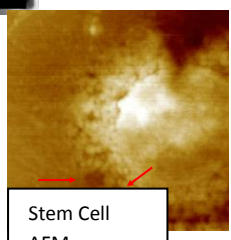





Water Immersion Objective For Excellence In Sepctral Imaging



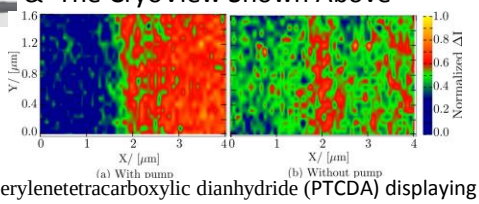
Stem Cell Fluorescence



Stem Cell AFM

# Non-linear Near-Field Optics With Illumination From Below Illumination From Above Or Both With Integration Packages For Fsec Lasers On the Same Optical Table

Femtosecond or Raman/FTIR Integration *Isolation* Packages Can Be Implemented For All Nanonics Systems Including Those With Environmental Chambers & The CryoView Shown Above

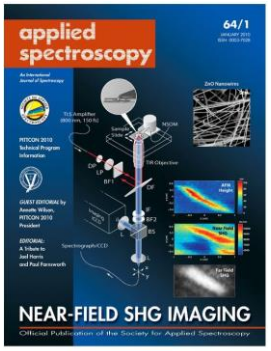



SNOM images of a 160 nm film of 3,4,9,10 perylenetetracarboxylic dianhydride (PTCDA) displaying absorption of the probe pulse at 650 nm, 200 fs after the pump excitation at 520 nm (a), and without pump excitation (b). The images were taken without accumulation of laser pulses (single shot data points)

**What Customers Published:**

The outputs of the OPAs were compressed to about 80 fs pulse duration by a prism compressor setup. After traversing computer controlled delay stages, the pump and probe beams were made collinear. Finally, they were coupled into an inverted microscope (Olympus) equipped with a commercial scanning probe microscopy (SPM) system (Nanonics Multiview 2000). >>>SNOM tips with aperture diameters of approximately 100 nm were used in the experiments. The height of the tip above the sample was kept constant with the tuning fork feed-back mechanism. The pump-probe SNOM (PPSNOM) images were taken by delaying the probe by 200 fs after the pump.

Apertureless Second Harmonic Generation

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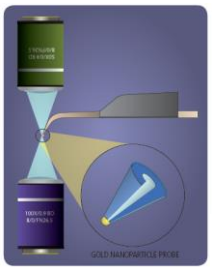
NANONICS IMAGING Ltd.

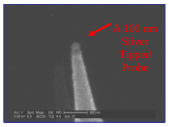
THE NEXT EVOLUTION IN NEAR-FIELD NANOCHARACTERIZATION™

# Vibrational Spectroscopy

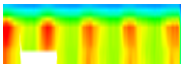
## Over A Decade of Tip Enhanced Raman

**Papers Published By Customers In Peer Reviewed Journals From 2001 Using Proven Innovative Tip Technology & Defined Methods For Optimal Success**





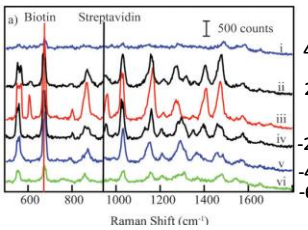

Aluminum Grating On Siliocn



200 nm

**Watch A Movie Of On-line TERS**

http://www.youtube.com/watch?v=vmKOEBwwNOw

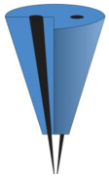


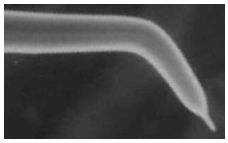

**Lateral Position Gold Nanoparticle Tip Relative To Protein Molecule Showing 20 nm Resolution**

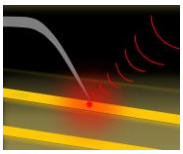
S. L. Carrier et al,"Protein–ligand binding investigated by a single nanoparticle TERS approach,"" *Chem. Comm.* **DOI: 10.1039/c0cc05059h**

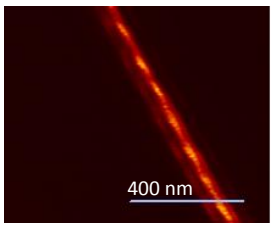
# From The IR To THz

## MultiWire Heater & Thermocouple Probe

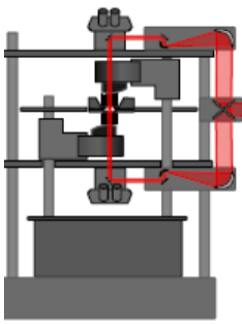




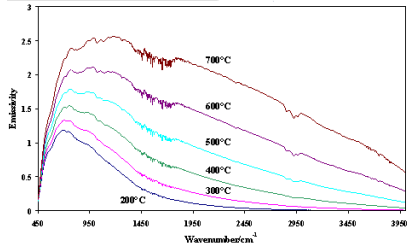





Silicon Waveguides Dopant Absorption Detected By NanoThermocouple



Active NSOM IR Source Spectral Imaging

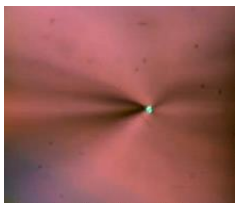


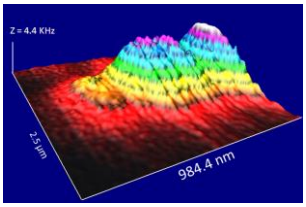

# Aperture less: The Basis of Nanonics' Excellence

- **Patented Antenna Probes With Highly Exposed Tips Containing Plasmonic & Non-Plasmonic Controlled Nanoparticle Quantitatively Characterized Embedded In Glass For High Dielectric Contrast**
- **Probes With Critically Important Transparent Shafts With No Scattering Background**
- **Multiprobe Illumination Protocols For UltraLow Background While Permitting 4π Steradians Far-field Illumination Flexibility**
- **Tuning Fork Background Free Feedback With No Jump To Contact & pN Force Sensitivity [As Demonstrated By A Nanonics Customer in "Mapping the Mechanical Action of Light," Phys. Rev. A 011807 (2011)]**
- **Tuning Fork Excellence in homo and heterodyne protocols as implemented by customers**
- **Multiple Tip & Sample Scanners With Tip Rigidly Held Relative To Illumination Source & Sample Feedback & Sample Movement For Imaging**

## Freedom From Artifact Prone ATec™ Silicon Probes

Now, In An Independent Study With A Home-Built System Ramos & Gordon ["Near-field Artifact In Tip Enhanced Raman Spectroscopy," Appl. Phys. Lett. **100**, 213111 (2012)] Have Quantitatively Demonstrated Scattering Artifacts Even in Raman From Silicon Probes & *Their Bottom Line Recommendation Is "Since light scattering by the tip shaft can be considerable, confocal light collection and the use of tips with smooth or transparent shafts are recommended. Finally, we note that demonstration and true application of TERS require rigorous consideration* and *measurement of near-field artifacts."*






Nanonics Excellence in ANSOM Stems From the Use of Multiprobe Technology Where One Probe Excites A Second Scattering Probe With A Transparent Shaft For Minimal Scattering Artifacts and Unparalleled ANSOM Whether Through Scattering or Other Innovative Protocols

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