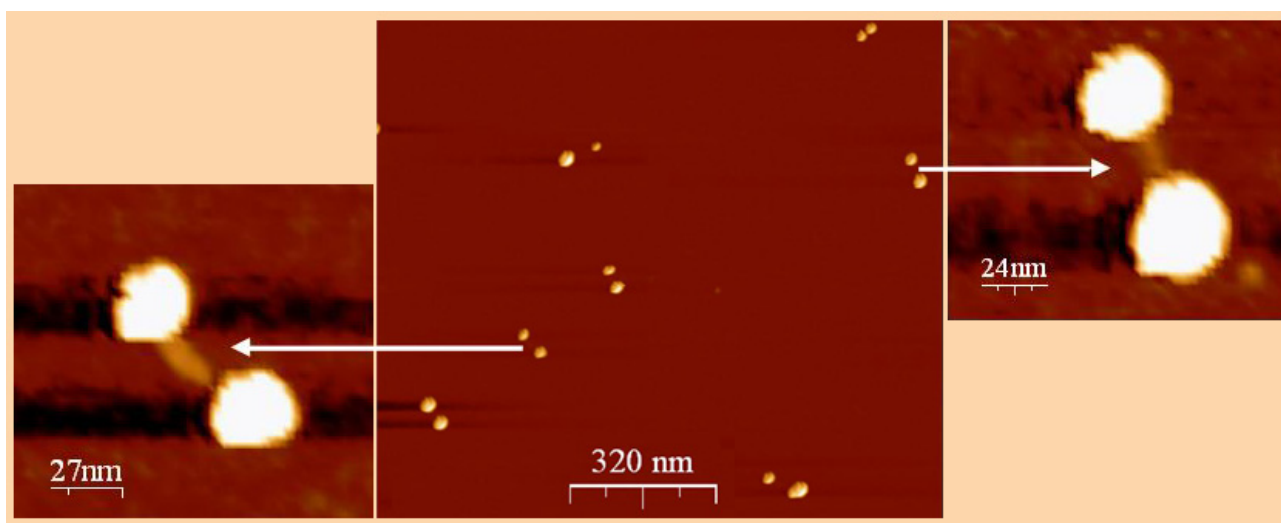




Molecular machines: from electronics to biology

Current microelectronics is based on silicon. However, the further miniaturization of the Si devices is the problem foreseen now. Therefore alternative approaches should be explored.

DNA-based electronics is a prime example of an entirely alternative approach. Efficient attachment of DNA to metal surfaces or electrodes is essential for charge-transport measurements, scanning tunneling microscopy, and for devices and sensors producing. It will take advantage of the unprecedented recognition and assembling properties of DNA. Such DNA-based nanoelectronic devices will enable to reduce the size of the current devices by approximately 1000 times.

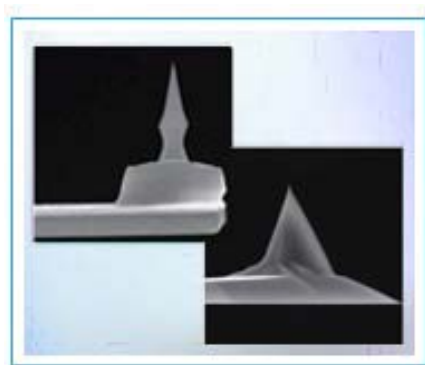


AFM image of two silver nanoparticles linked by DNA (DNA-based conducting nanowires and nanodevices)

Author: Prof. Alexander Kotlyar, Tel Aviv University,
The image was obtained by [ETALON probes](#).

The image was presented
to the NT-MDT probes [ProIMAGE Contest 2009](#).

The equipment



[ETALON probes](#)

High accuracy polysilicon AFM probes with high aspect ratio tip (curvature radius 10 nm) and high accuracy resonant frequency (typical dispersion $\pm 20\%$). These [ETALON probes](#) series is the very tips needed for researches performed in the molecular electronics field.

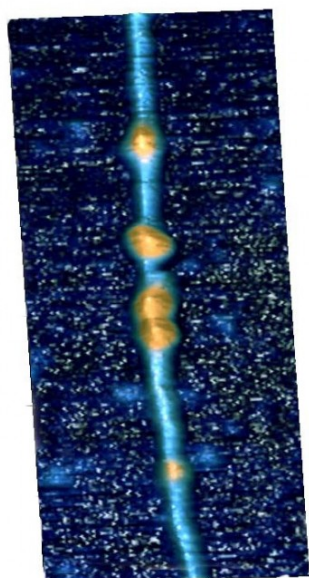
[GOLDEN probes](#)

Conventional high resolution AFM silicon probes for contact mode are available with different coatings (Au, Al, PtIr, TiN, Au, diamond doped conductive etc) and tipless. Probes without any coating and for non-contact modes can be supplied as well.



Molecular machines: from electronics to biology

The organic and plastic electronics is area projected to grow into a \$30 billion industry by 2015. This neighborhood branch of science includes also the integration of electronics and biomaterial for the purpose of creating bimolecular machines, which have wide-spread sphere of application (chemistry, physics, biology, medicine, materials science, nanoscience, engineering and device fabrication etc).



AFM image of complex: single protein (trypsin) - single wall carbon nanotube deposited on mica. These biomolecules (radius of gyration ~ 6 nm) adsorb spontaneously on the sidewalls of SWNT. The atomically flat surface is required in order to observe SWNT with diameter $\sim 1-1.7$ nm. There is no binding of CNT on negatively charge surface of mica in absence of biomolecules. The coupling of carbon nanotubes (CNTs) with biomolecules represents a prototype system for bio-nanomaterials conjugates, which preludes to the integration of electronic functionality into biomolecular recognition.

Author: Dr. Eva Bystrenova, ISMN-CNR

Scan size: 80 x 250 nm

The image was obtained by probes [NSG11](#).

The image was presented to the NT-MDT probes [ProIMAGE Contest 2009](#).

The equipment



Probe NanoLaboratory [NTEGRA Aura](#) performs under controlled atmosphere environments. [NTEGRA Aura](#) wide capabilities allow to produce and investigate the DNA derivatives with electrical properties, as well as to carry out researches in the sphere of molecular biology.

ProIMAGE Contest

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