

Fabrication of tips for scanning probe microscopy with enhanced resolution

CSIC has developed tips for scanning probe microscopy (SPM) where an isolated nanoparticle is placed at the apex of the tip. The method allows to tailor the shape, size and composition of the nanoparticle improving the measuring capabilities of the tips. These novel tips are suitable for techniques that combine imaging, such as SPM and spectroscopy like tip-enhanced Raman spectroscopy (TERS).

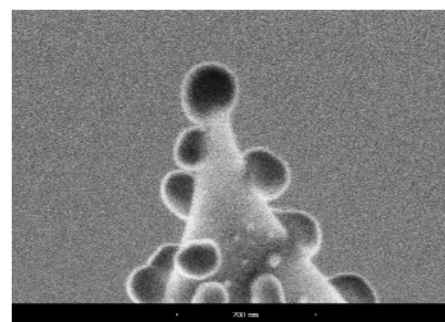
Industrial partners manufacturers of laboratory equipment are being sought to collaborate through a patent license agreement.

An offer for Patent Licensing

Overcoming the limitations of current TERS

TERS brings Raman spectroscopy into nanoscale resolution imaging. The key in TERS is a properly enhancing probe. That's the reason why many efforts have been focused on improving tip resolution being the deposition of nanoparticles a suitable way to improve it. However, there is yet the need of developing tips with suitable control of the size, shape, composition and interparticle distance of the nanostructured coating that can be implemented in a simple manner.

CSIC has developed a method to produce tips that comprise a cluster of single nanoparticle or a group of nanoparticles directly coated onto its apex, with no physical contact with the rest of nanoparticles of the tip. This arrangement of nanoparticles, where a precise control of particle size is achieved, provides a greater sensitivity and contrast, thanks to the excitation of localised surface plasmons at the tip apex of a single nanoparticle. Besides, the nanoparticle acts as a resonant dipole antenna, enhancing the Raman scattering, improving the signal-to-noise ratio and increasing spatial resolution.



AFM tip coated with Au nanoparticles

Main innovations and advantages

- It eases the fabrication of tips for SPM with high resolution in a simple and direct manner
- In contrast with other methods, there is no need of physical or chemical pre-treatment before the deposition of nanoparticles in the tip.
- Nanoparticles of Au, Ag can be placed onto the tips.
- The method is suitable to be used in the fabrication of tips for many SPM technique such as: magnetic force microscopy, TERS, nano infrared microscopy, kelvin probe force microscopy, piezoresponse force microscopy or scanning capacitance microscopy.

Patent Status

European priority patent application filed suitable for international extension

For more information, please contact:

Patricia Thomas Vielma, Ph.D

Deputy Vice-Presidency for Knowledge Transfer.

Spanish National Research Council (CSIC)

Tel.: +34 915681825

E-mail: patricia.thomas@csic.es
comercializacion@csic.es