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Remote Excitation Probe for Tip-Enhanced Raman Spectroscopy

Tech ID: 31697 / UC Case 2019-125-0

PATENT STATUS

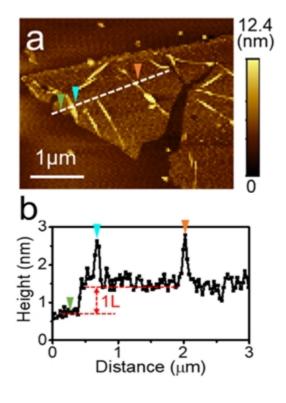
Country	Туре	Number	Dated	Case
United States Of America	Published Application	2022004291	02/10/2022	2019-125

BACKGROUND

The tip-enhanced Raman spectroscopy (TERS) imaging technique is designed to provide correlated morphological and chemical information of molecules under fifty nanometers in size. To do this, a TERS system essentially brings together the benefits of scanning probe, microscopy, and spectroscopy technologies. Incident light is coupled to the plasmonic resonance of the excitation probe to generate Raman signals. However, the quality and resolution of current TERS images is limited due to how uncoupled light directly excites the background of the image and causes it to blur.

BRIEF DESCRIPTION

Profs. Ruoxue Yan, Ming Liu, and their colleagues from the University of California, Riverside have developed a remote-excitation TERS (RE-TERS) probe that prevents uncoupled light from compromising the quality of TERS images. The probe utilizes silver nanoparticles as nanoantennas to mediate the coupling of light to surface plasmon polaritons (SPPs) in a sharp-tip silver nanowire to excite Raman signals remotely. The probe is easy to produce and overcomes the greatest obstacle that stands between scientists and TERS images with high spatial resolution at the nanoscale.



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OTHER INFORMATION

KEYWORDS

Raman spectroscopy, tip-enhanced

Raman spectroscopy, remote-

excitation, plasmonic antenna

CATEGORIZED AS

▶ Imaging

▶ Molecular

RELATED CASES

2019-125-0, 2019-116-0

Fig 1. RE-TERS mapping of a chemical vapor deposition-grown molybdenum disulfide (MoS₂) monolayer flake. (a) atomic force microscopy image of the MoS₂ flake on an ultrasmooth gold substrate with the line-scan shown in (b). The markers indicate the edge of the MoS₂ flake (green) and two wrinkles (light blue and orange).

APPLICATIONS

The probe may be used

- ▶ with Raman-Spectroscopy imaging equipment to upgrade the image quality
- ▶ in applications where high resolution and sensitivities are needed, for example, in near-field scanning, optical imaging, and sensing

RELATED MATERIALS

➤ Xuezhi Ma, et. al. Toward High-Contrast Atomic Force Microscopy-Tip-Enhanced Raman Spectroscopy Imaging: Nanoantenna-Mediated Remote-Excitation on Sharp-Tip Silver Nanowire Probes. Nano Letters 2019 19 (1), 100-107 - 12/04/2018

RELATED TECHNOLOGIES

▶ High External-Efficiency Nanofocusing for Lens-Free Near-Field Optical Microscopy

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