IMPROVED SURFACE ENHANCED RAMAN SPECTROSCOPIC (SERS) METHOD OPERATING IN THE SHORTWAVE INFRARED

Tech ID: 33678 / UC Case 2025-010-0

PATENT STATUS

Patent Pending

BRIEF DESCRIPTION

Raman spectroscopy, the inelastic scattering of light off molecular vibrations or solid- state phonons, is a critical method in chemical analytics, biological imaging, and materials or even art characterization. A common method for signal enhancement is surface enhanced Raman spectroscopy (SERS), where noble metal or dielectric nanostructures locally enhance the incoming and/or scattered field. SERS has found wide-spread applications in bio- analytics, fundamental science, viral and bacterial classification, and the study of tissue samples. Yet, obstacles towards more wide-spread adoption with wider scope are poor SERS substrate reproducibility and local hotspot fluctuations of metallic SERS substrates, and background emission from molecules, analytes, hot electrons, plasmons, or carriers in dielectrics that can significantly interfere with small signals of target analytes in SERS.

UC Berkeley researchers have developed an improved method for SERS that simultaneously minimizes spurious background emission, minimizes local heating even under high excitation powers, and maximizes the Raman signal enhancement of dielectric SERS substrates. Together these advantages render the method a powerful contender for sought after quantitative SERS and reliable analyte and single- molecule detection without fluctuations or other perturbations from SERS substrates. This enables commercially relevant usage, particularly in the biosciences and diagnostics, DNA/RNA sequencing, protein sequencing, determination of biomolecular binding constants, interconversion kinetics between biomolecular conformers, post-translational modifications, determination of molecular folding statuses, and classification of different proteoforms. It further has commercial potential in environmental monitoring, food safety, semiconductor inspection, polymer quality control and research, quality control in pharmaceuticals – including vesicles for drug delivery-, materials science, and physical science research.

SUGGESTED USES

Surface-enhanced Raman spectroscopy

ADVANTAGES

Addresses multiple sources of signal-to-noise limitations of prior SERS methods for widespread use on, among other targets, single molecule spectroscopy

RELATED MATERIALS

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OTHER INFORMATION

CATEGORIZED AS

» **Optics and Photonics**
» All Optics and Photonics
» **Biotechnology**
» Health
» Other
» Proteomics
» **Materials & Chemicals**
» Biological
» Nanomaterials
» **Research Tools**
» Bioinformatics
» Nucleic Acids/DNA/RNA
» Other
» Screening Assays
» **Engineering**
» Other

RELATED CASES

2025-010-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Spectral Fluctuation Raman Spectroscopy (SFRS)
- Nanophotonic Perovskite Scintillator For Time-Of-Flight Gamma-Ray Detection

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