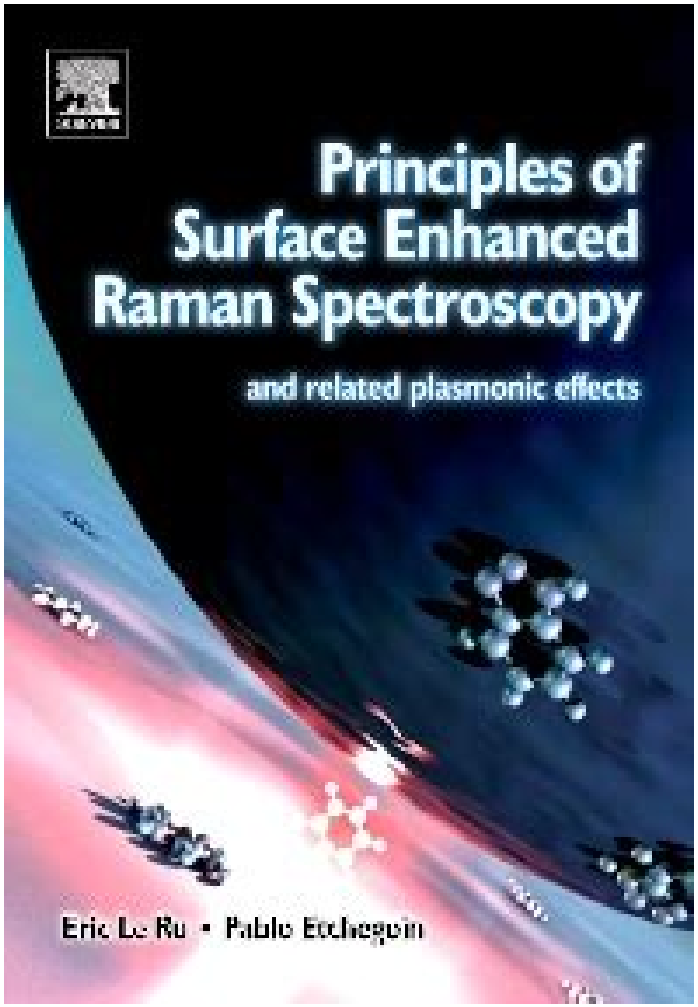
Principles of
Surface Enhanced
Raman Spectroscopy
and related plasmonic effects
Eric Le Ru • Pablo Etchegoin

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1. Surface

Surface-enhanced Raman spectroscopy or **surface-enhanced Raman scattering** (SERS) is a **surface**-sensitive technique that enhances **Raman scattering** by molecules adsorbed on rough metal **surfaces** or by nanostructures such as plasmonic-magnetic silica nanotubes.

2. Present and Future of Surface

The discovery of the enhancement of **Raman scattering** by molecules adsorbed on nanostructured metal **surfaces** is a landmark in the history of spectroscopic and analytical techniques. Significant experimental and theoretical effort has been directed toward understanding the **surface-enhanced Raman** scatt â€¦

3. Surface

Surface-enhanced Raman spectroscopy (SERS) is all about amplifying **Raman** signals from molecules, by several orders of magnitude [8]. SERS is a technique where molecules undergo much higher **scattering** efficiencies when adsorbed on metal colloidal nanoparticles or rough metal **surfaces**.

4. Surface Enhanced Raman Scattering Revealed by Interfacial

Surface enhanced Raman scattering (SERS) is a fingerprint spectral technique whose performance is highly dependent on the physicochemical properties of the substrate materials.

5. Designing surface

Surface-enhanced Raman scattering (SERS) is a molecule-specific spectroscopic technique with diverse applications in (bio)chemistry, clinical diagnosis and toxin sensing. While hotspot engineering has expedited SERS development, it is still challenging to detect molecules with no specific affinity to plasmonic **surfaces**.

6. Surface

In this study, we report a **surface-enhanced Raman scattering** (SERS)-active array film, which is based on regenerated cellulose hydrogels and gold nanorods (AuNRs), by combining a silicon rubber mask with a vacuum filtration method. This strategy enables the direct AuNR array formation on hydrogel **surface** with a precisely controlled number density.

7. Surface

Surface-enhanced Raman scattering (SERS) effect deals with the gigantic amplification of the weak **Raman scattering** intensity by molecules in the presence of a nanostructured metallic **surface** [5 - 8].

8. Surface enhanced Raman scattering from silver electrodes

of **surface** interactions has fostered the discovery and development of new methods to probe interfacial regions. One new method which has recently been discovered, and is the subÂ- ject of this dissertation, is **surface enhanced Raman scattering** (SERS).

9. Present and Future of Surface

Surface-enhanced Raman scattering, or SERS, is a commonly used sensing technique in which inelastic light **scattering** (Figure 1) by molecules is greatly **enhanced** (by factors up to 10 8 or even larger, enabling single-molecule (SM) SERS in some cases) when the molecules are adsorbed onto corrugated metal **surfaces** such as silver or gold nanoparticles (NPs).

10. Raman Scattering and Surface Enhanced Raman Spectroscopy

Raman Scattering and **Surface Enhanced Raman** Spectroscopy Last updated; Save as PDF Page ID 789; 5. Applications; References; Figure 1: A typical representation of measurements taken using **Raman** Spectroscopy Figure 2: Jablonski diagrams depicting the Stokes and Anti-Stokes shifts associated with **Raman scattering**. Figure 3: Refraction of light between two media.

11. Basic Principles of Surface Enhanced Raman Scattering

We will present the basics of **Surface-Enhanced Raman** including theory, advantages, limits and some practical advices.
http://www.horiba.com/fr/scientific/pro...

12. Surface

When the **scattering** molecules are on a textured **surface**, the **Raman scattering** can be greatly **enhanced** (thus the term **Surface Enhanced Raman scattering** (SERS)). Direct simulation of this non-linear **Raman scattering** is quite challenging (as are most non-linear processes). Most often, FDTD simulations are used to measure the **scattering** enhancement.

13. A Filter Supported Surface

This work designs a convenient method for fabrication of **surface-enhanced Raman scattering** (SERS) devices by loading gold nanostars (AuNSs) on a flat filter support with vacuum filtration.

14. com Surface

Almost 30 years after the first reports on **surface-enhanced Raman** signals, the phenomenon of **surface-enhanced Raman scattering** (SERS) is now well established. Yet, explaining the enhancement of a spectroscopic signal by fouteen orders of magnitude continues to attract the attention of physicists and chemists

alike.

15. A pH ratiometrically responsive surface enhanced resonance

Herein, we report a pH responsive ratiometric **surface-enhanced Raman scattering** (SERRS) probe that determined physiological pHs with a high sensitivity and tissue penetration depth via an innovative mechanism named spatial orientation induced intramolecular energy transfer (SOIET).

16. Surface

Surface-Enhanced Raman Scattering (SERS) **Raman** signals are inherently weak, especially when using visible light excitation and so a low number of scattered photons are available for detection. One method to amplify weak **Raman** signals is to employ **surface-enhanced Raman scattering** (SERS).

17. Quantizing single

By exploiting the very strong electromagnetic field localized in hot spots at the wavelength of the Fano minimum (29 - 31), we developed a platform for quantizing **surface-enhanced Raman scattering**...

18. Gas Sensor Based on Surface Enhanced Raman Scattering

In order to address problems of safety and identification in gas detection, an optical detection method based on **surface enhanced Raman scattering** (SERS) was studied to detect ethanol vapor. A SERS device of silver nanoparticles modified polyvinylpyrrolidone (PVP) was realized by freeze-drying method. This SERS device was placed in a micro transparent cavity in order to inject ethanol vapor of ...

19. Enantiomeric Discrimination by SurfaceEnhanced Raman

A **surfaceâ€•enhanced Raman** scatteringâ€•chiral anisotropy (SERSâ€•ChA) effect is reported that combines chiral discrimination and **surface Raman scattering** enhancement on chiral nanostructured Au films (CNAFs) equipped in the normal **Raman scattering** Spectrometer.

20. SERS Materials applications and the future

Surface enhanced Raman spectroscopy (SERS) is a powerful vibrational spectroscopy technique that allows for highly sensitive structural detection of low concentration analytes through the amplification of electromagnetic fields generated by the excitation of localized **surface** plasmons.

21. Single Molecule Detection Using Surface

Abstract. By exploiting the extremely large effective cross sections (10-17-10-16 cm 2 /molecule) available from **surface-enhanced Raman scattering** (SERS), we achieved the first observation of single molecule **Raman scattering**. Measured spectra of a single crystal violet molecule in aqueous colloidal silver solution using one second collection time and about 2Ã—10 5 W/cm 2 nonresonant near ...

22. Surface enhanced Raman scattering artificial nose for high

Label-free **surface-enhanced Raman** spectroscopy (SERS) can interrogate systems by directly fingerprinting their components' unique physicochemical properties. In complex biological systems however, this can yield highly overlapping spectra that hinder sample identification. Here, we present an artifi â€¦

23. Adaptive optics approach to surface

Surface-enhanced Raman scattering (SERS) spectroscopy is a popular technique for detecting chemicals in small quantities. Rough metallic **surfaces** with nanofeatures are some of the most widespread and commercially successful substrates for efficient SERS measurements. A rough metallic **surface** creates a high-density random distribution of so-called "hot spots" with local optical field ...

24. What Is Surface Enhanced Raman Scattering

Surface enhanced Raman scattering is phenomenon whereby the normally faint light signals that are associated with **Raman scattering** become much more powerful and more easily detectable. While **Raman** spectroscopy is a useful means of identifying molecules present in a material or solution, it is limited by the fact that the effect is very weak, with normally only one in every 10 8 incoming ...

25. Raman and Surface

Surface-enhanced Raman scattering is used to study the **Raman** spectra and peak shifts the thrombin-binding aptamer (TBA) on substrates having two different geometries; one with a single stranded ...

26. Surface

Surface-enhanced Raman scattering (SERS) is a molecular-specific spectroscopic technique that provides up to 1010-fold enhancement of signature **Raman** fingerprints using nanometer-scale 0D to 2D ...

27. Probing Single Molecules and Single Nanoparticles by

Emission-polarized **surface-enhanced Raman** signals of R6G observed from a single Ag nanoparticle with a polarization-scrambled confocal laser beam. A dichroic sheet polarizer was rotated 90Â° to...

28. Single Molecule Detection Using Surface

By exploiting the extremely large effective cross sections (10 âˆ’ 17 - 10 âˆ’ 16 cm 2 / molecule) available from **surface-enhanced Raman scattering** (SERS), we achieved the first observation of single molecule **Raman scattering**.Measured spectra of a single crystal violet molecule in aqueous colloidal silver solution using one second collection time and about 2 Ã— 10 5 W / cm 2 nonresonant ...

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