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Nota di contenuto	Front cover; Half title; Title; Copyright page; Table of Contents; Preface; Notations, units and other conventions; Chapter 1. A quick overview of surface-enhanced Raman spectroscopy; What is SERS? -- Basic principles; SERS probes and SERS substrates; SERS substrates; SERS probes; Example; Other important aspects of SERS; SERS enhancements; Sample preparation and metal/probe interaction; Main characteristics of the SERS signals; Related techniques; Related areas; Applications of SERS; Raman with improved sensitivity; SERS vs fluorescence spectroscopy; Applications specific to SERS The current status of SERS Brief history of SERS; Where is SERS now?; Current `hot topics'; Overview of the book content; General outline of the book; General `spirit' of the book; Different reading plans; Chapter 2. Raman spectroscopy and related optical techniques; A brief introduction; The discovery of the Raman effect; Some applications of Raman spectroscopy; Raman spectroscopy instrumentation; Optical spectroscopy of molecules; The energy levels of molecules; Spectroscopic units and conversions; Optical absorption; Emission and

luminescence; Scattering processes

The concept of cross-section The Raman cross-sections; Examples of Raman cross-sections; Mechanical analogs; Absorption and fluorescence spectroscopy; Optical absorption and UV/Vis spectroscopy; Fluorescence spectroscopy; Photo-bleaching; Phenomenological approach to Raman scattering; Dipolar emission in vacuum; The concepts of polarizability and induced dipole; The linear optical polarizability; The Raman polarizability; The local field correction; Polarizabilities and scattering cross-sections; Final remarks on the phenomenological description; Vibrations and the Raman tensor General considerations A primer on vibrational analysis; The Raman tensor; Link to the Raman polarizability; Limitations of the classical approach; A brief overview of related Raman scattering processes; Quantum (or semi-classical) approach to Raman scattering; Justification of the classical approach; The quantization of vibrations; The full expressions for the Raman cross-section; The anti-Stokes to Stokes ratio; Advanced aspects of vibrations in molecules; More on vibrational analysis; More on symmetries and Raman selection rules; Modeling of molecular structure and vibrations; Summary Chapter 3. Introduction to plasmons and plasmonics Plasmonics and SERS; The optical properties of noble metals; The Drude model of the optical response; The optical properties of real metals; Non-local optical properties; What makes the metal--light interaction so special?; What are plasmons?; The plasmon confusion; Definition and history; The relation between plasmons and the dielectric function; Electromagnetic modes in infinite systems; Electromagnetic modes of a system of material bodies; Classification of electromagnetic modes; Other properties of electromagnetic modes Summary and discussion

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### Sommario/riassunto

SERS was discovered in the 1970's and has since grown enormously in breadth, depth, and understanding. One of the major characteristics of SERS is its interdisciplinary nature: it lies at the boundary between physics, chemistry, colloid science, plasmonics, nanotechnology, and biology. By their very nature, it is impossible to find a textbook that will summarize the principles needed for SERS of these rather dissimilar and disconnected topics. Although a basic understanding of these topics is necessary for research projects in SERS with all its many aspects and applications, they are seldom...

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