



Principles of Surface-Enhanced Raman Spectroscopy

and related plasmonic effects

Eric C. Le Ru • Pablo G. Etchegoin

Principles Of Surface Enhanced Raman Spectroscopy And Related Plasmonic Effects

Vladimir Havlicek, Jaroslav Spizek



Principles Of Surface Enhanced Raman Spectroscopy And Related Plasmonic Effects:

Principles of Surface-enhanced Raman Spectroscopy Eric C. Le Ru, Pablo Gabriel Etchegoin, 2009 Besides an overview of current promising research topics this book is a self contained introduction to Raman spectroscopy and fluorescence that summarises the main concepts and ideas needed for SERS It is also a self contained introduction to the physics of plasmon resonances within the broader scope of plasmonics A detailed presentation of the SERS electromagnetic model and its extension to surface enhanced fluorescence is included Aimed primarily at newcomers to the field graduate students and other researchers or scientists attracted by the many possible applications of SERS and plasmonics or their basic science

Book Jacket *Principles of Surface-Enhanced Raman Spectroscopy* Eric Le Ru, Pablo Etchegoin, 2008-11-17 SERS was discovered in the 1970s 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 touched upon as a coherent unit during most undergraduate studies in physics or chemistry This book intends to fill this existing gap in the literature It provides an overview of the underlying principles of SERS from the fundamental understanding of the effect to its potential applications It is aimed primarily at newcomers to the field graduate students researchers or scientists attracted by the many applications of SERS and plasmonics or its basic science The emphasis is on concepts and background material for SERS such as Raman spectroscopy the physics of plasmons or colloid science all of them introduced within the context of SERS and from where the more specialized literature can be followed Represents one of very few books fully dedicated to the topic of surface enhanced Raman spectroscopy SERS Gives a comprehensive summary of the underlying physical concepts around SERS Provides a detailed analysis of plasmons and plasmonics

Principles of Surface-Enhanced Raman Spectroscopy and Related Plasmon Effects Eric C. Le Ru, 2009 *Surface-Enhanced Raman Spectroscopy* Marek Prochazka, 2015-12-12 This book gives an overview of recent developments in RS and SERS for sensing and biosensing considering also limitations possibilities and prospects of this technique Raman scattering RS is a widely used vibrational technique providing highly specific molecular spectral patterns A severe limitation for the application of this spectroscopic technique lies in the low cross section of RS Surface enhanced Raman scattering SERS spectroscopy overcomes this problem by 6 11 orders of magnitude enhancement compared with the standard RS for molecules in the close vicinity of certain rough metal surfaces Thus SERS combines molecular fingerprint specificity with potential single molecule sensitivity Due to the recent development of new SERS active substrates labeling and derivatization chemistry as well as new instrumentations SERS became a very promising tool for many varied applications including bioanalytical studies and sensing Both intrinsic

and extrinsic SERS biosensing schemes have been employed to detect and identify small molecules nucleic acids and proteins and also for cellular and in vivo sensing

Developments in Electrochemistry Derek Pletcher,Zhong-Qun Tian,David Williams,2014-06-03 Martin Fleischmann was truly one of the fathers of modern electrochemistry having made major contributions to diverse topics within electrochemical science and technology These include the theory and practice of voltammetry and in situ spectroscopic techniques instrumentation electrochemical phase formation corrosion electrochemical engineering electrosynthesis and cold fusion While intended to honour the memory of Martin Fleischmann *Developments in Electrochemistry* is neither a biography nor a history of his contributions Rather the book is a series of critical reviews of topics in electrochemical science associated with Martin Fleischmann but remaining important today The authors are all scientists with outstanding international reputations who have made their own contribution to their topic most have also worked with Martin Fleischmann and benefitted from his guidance Each of the 19 chapters within this volume begin with an outline of Martin Fleischmann s contribution to the topic followed by examples of research established applications and prospects for future developments The book is of interest to both students and experienced workers in universities and industry who are active in developing electrochemical science

Natural Products Analysis Vladimir Havlicek,Jaroslav Spizek,2014-10-13 This book highlights analytical chemistry instrumentation and practices applied to the analysis of natural products and their complex mixtures describing techniques for isolating and characterizing natural products Applies analytical techniques to natural products research an area of critical importance to drug discovery Offers a one stop shop for most analytical methods x ray diffraction NMR analysis mass spectrometry and chemical genetics Includes coverage of natural products basics and highlights antibacterial research particularly important as efforts to combat drug resistance gain prominence Covers instrumental techniques with enough detail for both current practitioners and beginning researchers

Nanoantenna Marc Lamy de la Chapelle,Annemarie Pucci,2013-01-24 This book concentrates on the various fields related to the development of a nanobiosensor and presents the latest information from renowned experts It focuses on the enhanced spectroscopy including SERS SEIRA SEIRS and near field optics and the related physical processes optical properties of metallic nanoparticles plasmon resonance field

Handbook of Graphene, Volume 6 Barbara Palys,2019-07-30 The sixth volume in a series of handbooks on graphene research and applications The Handbook of Graphene Volume 6 Biosensors and Advanced Sensors discusses the unique benefits that the discovery of graphene has brought to the sensing and biosensing sectors It examines graphene s use in leading edge technology applications and the development of a variety of graphene based sensors The handbook looks at how graphene can be used as an electrode substrate or transducer in sensor design Graphene based sensor detection has achieved up to femto levels with performances delivering the advantages of greater selectivity sensitivity and stability

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Nanocharacterization Techniques Osvaldo de Oliveira Jr, Ferreira LG Marystela, Fábio de Lima Leite, Alessandra Luzia Da Róz, 2017-03-18 Nanocharacterization Techniques covers the main characterization techniques used in nanomaterials and nanostructures The chapters focus on the fundamental aspects of characterization techniques and their distinctive approaches Significant advances that have taken place over recent years in refining techniques are covered and the mathematical foundations needed to use the techniques are also explained in detail This book is an important reference for materials scientists and engineers looking for a through analysis of nanocharacterization techniques in order to establish which is best for their needs Includes a detailed analysis of different nanocharacterization techniques allowing readers to explore which one is best for their particular needs Provides examples of how each characterization technique has been used giving readers a greater understanding of how each technique can be profitably used Covers the mathematical background needed to utilize each of these techniques to their best effect meaning that readers can gain a full understanding of the theoretical principles behind each technique covered Serves as an important go to reference for materials scientists and engineers

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