

Preface

This book is focus mainly on vibrational spectroscopy, Raman scattering and infrared absorption, and their applications in biology and medicine. When talking about new techniques, beside imaging or surface-enhanced spectroscopy also the investigation of optical activity of the samples became significantly common. In view of the fact that beside vibrational spectroscopy also electronic absorption is presented here as a potent and complementary tool to study absolute configuration, the overall topic of this book is named “optical spectroscopy”, however the main part is devoted to vibrational methods.

Since the sample investigation is often complicated, especially when a specific analyte is spread in the biomatrix and occurs in low concentration, it is necessary to support the analysis by theoretical methods including chemometrics or 2D correlation spectroscopy. Demonstrated here approach connecting optical spectroscopy with computer methods is shown as a powerful tool that can be successfully used in biology and medicine to study very complex samples.

The book contains a short introduction followed by a set of examples presenting results obtained by using spectroscopy combined with calculations. New techniques and its special application are based on Surface-Enhanced Raman Spectroscopy (SERS), Raman Optical Activity (ROA), Vibrational Circular Dichroism (VCD), Electronic Circular Dichroism (ECD) and matrix isolation spectroscopy. For biological applications the analysis of secondary and primary plant components in the tissue and single cells is demonstrated. After that, biomedical applications of optical spectroscopy related to disease diagnosis including the identification of illnesses biomarkers. A broad qualitative, quantitative and structural study is possible when the advanced computer methods are used.

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Optical Spectroscopy and Computational Methods in
Biology and Medicine

Baranska, M. (Ed.)

2014, XII, 540 p. 204 illus., 134 illus. in color.,

Hardcover

ISBN: 978-94-007-7831-3