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Nota di contenuto	Infrared and Raman Spectroscopic Imaging; Contents; Preface; List of Contributors; Part I Basic Methodology; Chapter 1 Infrared and Raman Instrumentation for Mapping and Imaging; 1.1 Introduction to Mapping and Imaging; 1.2 Mid-Infrared Microspectroscopy and Mapping; 1.2.1 Diffraction-Limited Microscopy; 1.2.2 Microscopes and Sampling Techniques; 1.2.3 Detectors for Mid-Infrared Microspectroscopy; 1.2.4 Sources for Mid-Infrared Microspectroscopy; 1.2.5 Spatial Resolution; 1.2.6 Transmission Microspectroscopy; 1.2.7 Attenuated Total Reflection Microspectroscopy 1.3 Raman Microspectroscopy and Mapping 1.3.1 Introduction to Raman Microspectroscopy; 1.3.2 CCD Detectors; 1.3.3 Spatial Resolution; 1.3.4 Tip-Enhanced Raman Spectroscopy; 1.4 Near-Infrared Hyperspectral Imaging; 1.5 Raman Hyperspectral Imaging; 1.6 Mid-Infrared Hyperspectral Imaging; 1.6.1 Spectrometers Based on 2D Array Detectors; 1.6.2 Spectrometers Based on Hybrid Linear Array Detectors; 1.6.3 Sampling; 1.7 Mapping with Pulsed Terahertz Radiation; 1.8 Summary; Acknowledgments; References; Chapter 2 Chemometric Tools for Image Analysis; 2.1 Introduction

2.2 Hyperspectral Images: The Measurement 2.2.1 The Data Set and the Underlying Model; 2.3 Image Preprocessing; 2.3.1 Signal Preprocessing; 2.3.1.1 De-noising; 2.3.1.2 Baseline Correction; 2.3.1.3 Detection and Suppression of Anomalous Pixels or Anomalous Spectral Readings; 2.3.2 Data Pretreatments; 2.3.3 Image Compression; 2.4 Exploratory Image Analysis; 2.4.1 Classical Image Representations: Limitations; 2.4.2 Multivariate Image Analysis (MIA) and Principal Component Analysis (PCA); 2.5 Quantitative Image Information: Multivariate Image Regression (MIR); 2.6 Image Segmentation 2.6.1 Unsupervised and Supervised Segmentation Methods 2.6.2 Hard and Fuzzy Segmentation Approaches; 2.6.3 Including Spatial Information in Image Segmentation; 2.7 Image Resolution; 2.7.1 The Image Resolution Concept; 2.7.2 Spatial and Spectral Exploration; 2.7.3 The Resolution Process: Initial Estimates and Constraints; 2.7.4 Image Multiset Analysis; 2.7.5 Resolution Postprocessing: Compound Identification, Quantitative Analysis, and Superresolution; 2.7.5.1 Compound Identification; 2.7.5.2 Quantitative Analysis; 2.7.5.3 Superresolution; 2.8 Future Trends; References

Part II Biomedical Applications Chapter 3 Vibrational Spectroscopic Imaging of Soft Tissue; 3.1 Introduction; 3.1.1 Epithelium; 3.1.2 Connective Tissue and Extracellular Matrix; 3.1.3 Muscle Tissue; 3.1.4 Nervous Tissue; 3.2 Preparation of Soft Tissue for Vibrational Spectroscopic Imaging; 3.2.1 General Preparation Strategies; 3.2.2 Vibrational Spectra of Reference Material; 3.2.3 Preparation for FT-IR Imaging; 3.2.4 Preparation for Raman Imaging; 3.3 Applications to Soft Tissue; 3.3.1 Colon Tissue; 3.3.2 Brain Tissue and Brain Tumors; 3.3.2.1 Mouse Brains; 3.3.2.2 Primary Brain Tumors 3.3.2.3 Secondary Brain Tumors

Sommario/riassunto

This second edition of the successful ready reference is updated and revised with approximately 30% new content to reflect the numerous instrumental developments and improvements, as well as the significant expansion of this rapidly developing field. For example, the combination of IR imaging with AFM has enhanced the achievable lateral resolution by an order of magnitude down to a few hundred nanometers, thus launching a multiplicity of new applications in material science. Furthermore, Raman and IR spectroscopic imaging have become key technologies for the life sciences and today contribute
