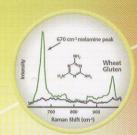
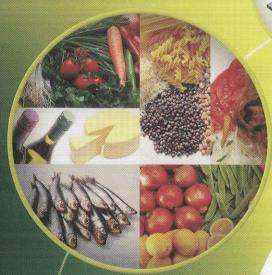
Editors
Eunice C. Y. Li-Chan, Peter R. Griffiths and John M. Chalmers







## Applications of Vibrational Spectroscopy in Food Science

Volume I Instrumentation and Fundamental Applications



## **Contents**

Volume I: Instrumentation and Fundamental Applications		Part Two: Advances in Instrumentation for Food Analysis	
Preface	V	Infrared Imaging: Principles and Practices	109
Acknowledgments	ix	Jacqueline Sedman, Andrew Ghetler, Alexander Enfield and	100
List of Contributors	XV	Ashraf A. Ismail	
Part One: Introduction and Basic Concepts		The Role of Confocal Raman Spectroscopy in Food Science Paul D.A. Pudney and Thomas M. Hancewicz	133
Introduction to Vibrational Spectroscopy in Food Science Eunice C.Y. Li-Chan	3	Raman Spectroscopic Imaging Patrick J. Treado, Ryan J. Priore and Matthew P. Nelson	167
Introduction to the Theory and Instrumentation for Vibrational Spectroscopy  Peter R. Griffiths	31	Surface-enhanced Raman Spectroscopy: Theory and Application to the Analysis of Chlorpyrifos in Orange Juice Chetan Shende, Frank Inscore, Atanu Sengupta and Stuart Farquharson	195
Vibrational Spectroscopy: Sampling Techniques and Fiber-optic Probes John M. Chalmers and Peter R. Griffiths	47	Part Three: Fundamental Research to Elucidate Properties and Processing- induced Changes	
Chemometrics in Biospectroscopy Achim Kohler, Nils Kristian Afseth and Harald Martens	89	Application of Vibrational Spectroscopy for the Study of Heat-induced Changes in Food Components Daniel E. Rubio-Diaz and Luis E. Rodriguez-Saona	213

Chemical Changes during Freezing and Frozen Storage of Fish Investigated by Vibrational Spectroscopy Pedro Carmona, Isabel Sánchez-Alonso and Mercedes Careche	229	The Role and Potential of Vibrational Spectroscopy in the Study and Characterization of Traditional and Novel Food Packaging Structures  Jose M. Lagaron and A. Lopez-Rubio	329
Application of Vibrational Spectroscopy to Investigate Radiation-induced Changes		Volume II: Analysis of Food, Drink and Related Materials	
in Food Feride Severcan and Ozlem Bozkurt	241	Part Four: Examples of Applications for Food Analysi and Quality Assurance	is
The Potential of Mid-infrared Spectroscopy for Monitoring Changes in Polysaccharides and Other Carbohydrates during Processing Manuel A. Coimbra, Alexandra Nunes, António S. Barros and Ivonne Delgadillo		The Analysis of Wheat by Near-infrared Spectroscopy Phil Williams	349
	261	In situ Fourier Transform Infrared Microspectroscopy and Imaging of Wheat Kernels and Other Grains David L. Wetzel and Lauren R. Brewer	367
Monitoring Oxidation of Lipids in Edible Oils and Complex Food Systems by Vibrational Spectroscopy	277	The Analysis of Rice by Vibrational Spectroscopy  David S. Himmelsbach	387
Maria José Ayora-Cañada, Ana Domínguez-Vidal and Bernhard Lendl		Applications of Vibrational Spectroscopy to Oilseeds Analysis Malgorzata Baranska,	397
Raman Spectroscopy for the Study of Molecular Order, Thermodynamics,		Hartwig Schulz, Marion Strehle and Jürgen Popp	
and Solid-Liquid Transitions in Triacylglycerols Eric Da Silva and Dérick Rousseau	297	Vibrational Spectroscopy Techniques in the Quality Assessment of Fruits and Vegetables	421
Applications of Vibrational Spectroscopy to Study Protein		Evgeny Polshin, Jeroen Lammertyn and Bart M. Nicolaï	
Structural Changes in Muscle and Meat Batter Systems Ana M. Herrero, Pedro Carmona, Francisco Jiménez-Colmenero and Claudia Ruíz-Capillas	315	Applications of Vibrational Spectroscopy to the Analysis of Fish and Other Aquatic Food Products Musleh Uddin and Emiko Okazaki	439
Ciunuiu Maix-Cupillius		musien Oddin and Emiko Okazaki	

Quantifying Meat Properties Using Near-infrared Spectroscopy Robert Burling-Claridge	461	Part Five: Applications Relat to Food Safety and Regulator Compliance	
Quality Analysis of Milk by Vibrational Spectroscopy Achim Kohler, Nils Kristian Afseth, Kjetil Jørgensen, Åshild Randby and Harald Martens	483	Regulatory Considerations in Applyir Vibrational Spectroscopic Methods for Quality Control Vincent Baeten, Juan Antonio Fernán Pierna, Frédéric Dehareng, Georges Sinnaeve and Pierre Dardenne	or 595
Applications of Vibrational Spectroscopy to the Study of Cheese and Other Fermented, Solid and Semi-solid Dairy Products Colette C. Fagan and Colm P. O'Donnell	501	Authentication and Traceability of Agricultural and Food Products Using Vibrational Spectroscopy Philippe Vermeulen, Juan Antonio Fernández Pierna, Ouissam Abbas, Pierre Dardenne and Vincent Baeten	609
Progression to Fatty Acid Profiling of Edible Fats and Oils Using Vibrational Spectroscopy Hormoz Azizian, John K.G. Kramer and Magdi M. Mossoba	519	Potential and Challenges of Applying Vibrational Spectroscopy to the Analysis of Trans Fats in Foods for Regulatory Compliance in the USA Magdi M. Mossoba, Julie Moss,	5 631
The Analysis of Grapes, Wine, and Other Alcoholic Beverages by Infrared Spectroscopy  Mark Gishen, Daniel Cozzolino and Robert G. Dambergs	539	John K.G. Kramer and Hormoz Azizian  The Application of Surface-enhanced Raman Spectroscopy to Identify and	
Analysis of Caffeine, Sweeteners, and Other Additives in Beverages by Vibrational Spectroscopy Salvador Garrigues, Sergio Armenta and Miguel de la Guardia	557	Quantify Chemical Adulterants or Contaminants in Foods  Mengshi Lin  Detection of Melamine in Foodstuffs by Vibrational Spectroscopy	649 663
Applications of Vibrational Spectroscopy to the Analysis of Polysaccharide and Hydrocolloid Ingredients Siu-Mei Choi, Sze-Nga Yuen,	577	Peter R. Griffiths  Investigating Food Spoilage and Pathogenic Microorganisms by Mid-infrared Spectroscopy Xiaonan Lu and Barbara Rasco	675
David Lee Phillips and Ching-Yung Ma		Index	695