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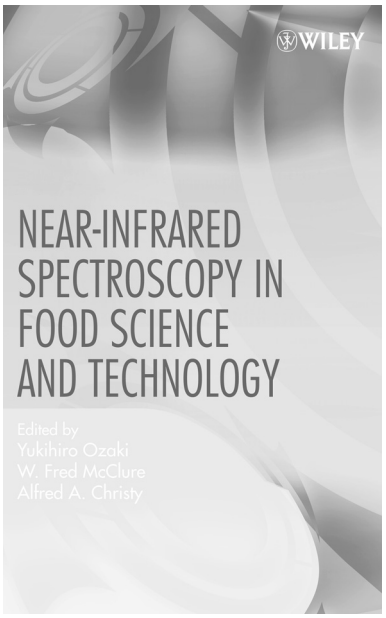

Near-Infrared Spectroscopy in Food Science and Technology

Yukihiro Ozaki, W. Fred McClure and Alfred A. Christy (Editors)
John Wiley & Sons, 2006, pp. 424
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Near-infrared spectroscopy (NIRS) has attracted remarkable interest over the last couple of decades and developed into an extremely important analytical tool for chemical structure elucidation, quality control and process monitoring. Reasons for this are the emergence of new hardware, development of hyphenated techniques such as time-of-flight NIRS, improvement of sampling techniques and the development of chemometric methods of analysis, especially for on-line applications. The editors, along with contributions from 28 further authors, have set out to address the growing circle of NIRS users as well as newcomers to this fast developing field. One of the editors, Yukihiro Ozaki, is ideally suited for this purpose as he co-edited one of the most important books in NIRS (Siesler, H. W., Ozaki, Y., Kawata, S., Heise, H. M. (Eds.) *Near-Infrared Spectroscopy. Principles, Instruments and Applications*, Wiley-VCH, Weinheim 2001).

Besides basic technical information, the present book offers chapters on basic principles, instrumentation, sample preparation, and chemometrics, with a major part covering fundamental applications for all important agricultural products and foodstuffs from grains and seeds, fruits and vegetables to meat and fish products. The first chapter begins with a concise account of the principles of molecular vibrations that are important for NIRS. Chapter 2 deals with spectral analysis and gives a comprehensive overview of the complexity of NIRS data. For selected examples the characteristics of NIR spectra are discussed. Band assignments are introduced and spectra-structure correlations as well as group frequencies are presented, providing an overview of the parameters that might influence spectral data. The chapters dealing with instrumentation highlight the implementation of time-of-flight spectroscopy into NIR analysis (Chapter 4), as well as the analysis of multivariate data in NIR (Chapter 6). Chapters 7 and 8 deal with the analysis of a selection of foodstuffs of varying origin. Each contribution starts with a short introduction and a historical overview of the main developments and instrumental improvements in that specific field. Current applications are reviewed and future trends discussed. NIR spectroscopy with its much lower absorptivities than IR and mid-IR spectroscopy is relatively easy to implement for on-line food quality control. This undisputed potential of NIR is underlined in Chapter 9 where specific on-line applications and instrumentation of process analyzers are discussed, illustrating techniques with examples from fermentation engineering through to all kinds of food products, including the analysis of intact fruits. The final section in this Chapter combines food technology aspects with medicinal chemistry. The quality of raw milk has a direct influence on milk processing and dairy products. Diagnosis of diseases such as bovine mastitis, which results in chemical changes in milk composition, can be made using NIR analysis of the somatic cell count which is used as an indicator of bovine health.

Although this is not a book to consult for facts, it imparts knowledge and understanding by describing the possibilities of NIR using selected examples. The individual contributions are not absolutely homogeneous in style and presentation, but the subjects are self-contained within the chapters and the illustrations are integrated well in the text. Owing to the complexity of the subject matter some aspects are handled twice but the introductions to each chapter offer coherency.

In my opinion the editors have created an excellent introduction into the complex field of NIR spectroscopy. I warmly recommend this book to all scientists already working in this field, but students will also find this work a useful complementary source of information.

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