

## Application Of Near Infrared Spectroscopy In Biomedicine

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~~**NIR Spectroscopy Introduction to NIR Technology** Application of Near Infrared Spectroscopy in Agriculture and Natural Resources **Physiological Monitoring Part 6 Near infrared spectroscopy**~~

~~Introduction to Infrared (IR) Spectroscopy | Basics and Practical Demonstration**Webinar - Near-Infrared NIR Spectroscopy and NIR-based Instrument Spectroscopy** - how to see the quality in food Applying Near Infrared Spectroscopy to Hydrocarbon Processing **Functional near-infrared spectroscopy (fNIRS) sensors FTIR Basics - Principles of Infrared Spectroscopy Near-Infrared QE-Enhancing Technology for Automotive Applications UCLA fNIRS Bootcamp Pt. 1 - Introduction to Using fNIRS for Human Social/Cognitive Neuroscience Dr. Marcelo Souza Recommendations - Near-Infrared Better Than Far-Infrared \u0026 Full Spectrum Gauges**~~

~~**Near Infrared SpectroscopyFunctional Near Infrared Spectroscopy To study learning in spatial navigation** A Simple explanation of Infrared Spectroscopy. **Near Infrared Spectrophotometer**~~

~~What's Near-Infrared spectroscopy (NIRS)?ITTO-CTTMS Near Infrared Spectroscopy NIRS for the monitoring of Mahogany trade IR spectroscopy principles basics Application Of Near Infrared Spectroscopy~~

~~Applications Astronomical spectroscopy. Near-infrared spectroscopy is in astronomy for studying the atmospheres of cool stars where... Agriculture. Near-infrared spectroscopy is widely applied in agriculture for determining the quality of forages, grains,... Remote monitoring. Techniques have been ...~~

Near-infrared spectroscopy - Wikipedia

Application of deep learning and near infrared spectroscopy in cereal analysis 1. Introduction. In recent years, near-infrared spectroscopy (NIR) has been widely used for the analysis of... 2. Establishment of model. An SSAE neural network consists of multiple basic sparse autoencoders (SAEs). The ...

Application of deep learning and near infrared ...

Since the 1990s, the application of near infrared spectroscopy (NIRS) in fields involving drugs, food, agriculture, the petroleum industry and environmental protection has developed rapidly6, 7. NIRS has many advantages in relation to QC and inspection 8 and allows classification, qualitative analysis and quantitative analysis of TCM products.

Application of near infrared spectroscopy to the analysis ...

Clinical Applications of Near-Infrared Spectroscopy in Neonates Abstract. Near-infrared spectroscopy (NIRS) can monitor regional cerebral oxygen saturation (rScO<sub>2</sub>), mostly... Keywords. The status of cerebral oxygenation is not always represented appropriately by systemic arterial oxygenation. ...

Clinical Applications of Near-Infrared Spectroscopy in ...

Near-infrared (NIR) spectroscopy combined with chemometrics was used as a technique to predict the potato flour content in Chinese steamed bread (CSB). The inner core of CSB was chosen as the measuring position for acquiring the NIR spectra. Spectra between 4000 and 10,000 cm<sup>-1</sup> were analysed using a partial least-squares regression.

Application of near-infrared spectroscopy for screening ...

Near-infrared spectroscopy has been studied and applied in numerous applications across five key product areas: fruits and vegetables, meats and fish, beverages and dairy, cereals and grain stocks, grapes, and olives; but also, areas regarding production factors like soils and manures, and environmental applications. The mechanisms of near-infrared spectroscopy are well understood and the benefits are clear.

Applications for NIR Spectroscopy in Agriculture and Food ...

Fagan, Castillo, O'Callaghan, Payne, and O'Donnell (2009) reviewed the application of infrared spectroscopy to milk and dairy products. Karoui et al. (2009) covered the application of infrared spectroscopy to eggs and egg products. Compared to other food commodities, only few applications have been reported; mainly the determination of egg freshness and the quantitation of the main components protein and fat in liquid and dried egg products was reported.

On-line application of near infrared (NIR) spectroscopy in ...

Abstract and Figures Raw materials, technological processes, intermediers and by-products of sugar industry have been characterized by near infrared (NIR) spectroscopy. Various sample preparation...

(PDF) Application of near infrared spectroscopy in the ...

Nevertheless, despite the mathematical treatment applied to the spectra, visible-near-infrared (Vis-NIR) spectroscopy was suitable only for rough screening purposes for moisture content and unsatisfactory for protein and intramuscular fat content predictions, according to the criteria established by Williams. 24,25 These results could have been due to the small range of values for protein ...

A Review of the Principles and Applications of Near ...

APPLICATIONS OF IR SPECTROSCOPY 1. Identification of functional group and structure elucidation. Entire IR region is divided into group frequency region... 2. Identification of substances. IR spectroscopy is used to establish whether a given sample of an organic substance is... 3. Studying the ...

APPLICATIONS OF IR SPECTROSCOPY | PharmaTutor

Recently, applications of near infrared spectroscopy have also been developed. By passing infrared light through a sample and measuring the absorption or transmittance of light at each frequency, an infrared spectrum is obtained, with peaks corresponding to the frequency of absorbed radiation.

Infrared: Application - Chemistry LibreTexts

This article reviews the application of an alternative method, functional near-infrared spectroscopy (fNIRS), to the study of age-related changes in cerebral hemodynamics and factors that influence cerebral hemodynamics in the elderly population.

A Systematic Review of the Application of Functional Near ...

Functional near-infrared spectroscopy (fNIRS) is such a neuroimaging tool especially suitable to investigate the effects of physical activity/exercises on cerebral oxygenation and hemodynamics due to its capability to quantify changes in the concentration of oxygenated hemoglobin (oxyHb) and deoxygenated hemoglobin (deoxyHb) non-invasively in the human brain.

Applications of Functional Near-Infrared Spectroscopy ...

A rapid, non-destructive, in-line method suitable for sorting green hem-fir timbers (115-mm square) based on moisture content was established by near-infrared (NIR) spectroscopy. The accuracy of NIR sorting was compared with a commercial capacitance-type moisture meter. Mixedspecies samples consisting of three moisture classes were assessed in this study.

Application of near-infrared spectroscopy for moisture ...

Near-Infrared Spectroscopy Near-infrared (NIR) spectroscopy is based on molecular overtone and combination vibrations. One advantage of NIR compared to MIR is that it can typically penetrate much further into a sample. Thus, it is useful for the analysis of bulk material and requires little sample preparation.

Applications of Portable Near-Infrared Spectroscopy

Functional near infrared spectroscopy (fNIRS) is a non-invasive optical imaging technique used to monitor cerebral blood flow (CBF) and by proxy neuronal activation. The use of fNIRS in nutritional intervention studies is a relatively novel application of this technique, with only a small, but growing, number of trials published to date.

Frontiers | The application of near infrared spectroscopy ...

In this review, we aim to highlight the application of functional near-infrared spectroscopy (fNIRS) as a useful neuroimaging technique for the investigation of cognitive development. We focus on brain activation changes during the development of mathematics and language skills in schoolchildren.

Applications of Functional Near-Infrared Spectroscopy ...

Near-infrared (NIR) spectroscopy is a very efficient method for high-throughput screening of plant materials for their chemical characteristics. It provides rapid, nondestructive, low-cost and environment-friendly measurements.

This book provides knowledge of the basic theory, spectral analysis methods, chemometrics, instrumentation, and applications of near-infrared (NIR) spectroscopy-not as a handbook but rather as a sourcebook of NIR spectroscopy. Thus, some emphasis is placed on the description of basic knowledge that is important in learning and using NIR spectroscopy. The book also deals with applications for a variety of research fields that are very useful for a wide range of readers from graduate students to scientists and engineers in both academia and industry. For readers who are novices in NIR spectroscopy, this book provides a good introduction, and for those who already are familiar with the field it affords an excellent means of strengthening their knowledge about NIR spectroscopy and keeping abreast of recent developments.

Over the last few years, near-infrared (NIR) spectroscopy has rapidly developed into an important and extremely useful method of analysis. In fact, for certain research areas and applications, ranging from material science via chemistry to life sciences, it has become an indispensable tool because this fast and cost-effective type of spectroscopy provides qualitative and quantitative information not available from any other technique. This book offers a balanced overview of the fundamental theory and instrumentation of NIR spectroscopy, introducing the material in a readily comprehensible manner. A considerable part of the text is dedicated to practical applications, including sample preparation and investigations of polymers, textiles, drugs, food and animal feed. However, special topics, such as two-dimensional correlation analysis, are also covered in separate chapters. Written by eight experts in different fields, this book presents an introduction to the current state of developments and is valuable to spectroscopists and to practitioners applying NIR spectroscopy as a daily analytical tool.

Since the completion of the first edition of this book, major developments have occurred in the pharmaceutical industry that have shaped the field of near-infrared (NIR) spectroscopy. A new initiative from the U.S. Food and Drug Administration (FDA) to modernize regulations of pharmaceutical manufacturing and drug quality has helped position NIR spectroscopy as an effective tool for pharmaceutical testing. Pharmaceutical and Medical Applications of Near-Infrared Spectroscopy, Second Edition reflects these developments and brings readers an up-to-date summary of how this technique is being applied to pharmaceutical manufacturing. Topics include: The origins and principles of NIR spectroscopy, including early instrumentation, spectroscopic theory, and light-particle interaction The physics of each instrument type, the strengths and weaknesses of each, and the manufacturers that produce them The possible advantages of using NIR methods for monitoring or controlling blending, as well as practical concerns for mixing processes NIR spectroscopy as applied to traditional granulation, drug layering, and film coating of beads or granules Pharmaceutical assays, including qualitative analysis, quantitative analysis, determination of actives in tablets and capsules, and considerations for intact dosage form analysis Steps involved in the validation and acceptance of an NIR spectroscopy method, including quality assurance, qualification and verification of instruments, and the International Conference on Harmonization (ICH) guidelines Medical applications, including those related to blood glucose measurements, tissue and major organ analysis, fetal analysis, and cancer research Providing comprehensive coverage of NIR spectroscopy, from theory, mathematics, application, and mechanics of NIR analysis, the book supplies ample references to facilitate further research into this burgeoning field.

In keeping with the style of the Handbook of Modern Biophysics, this fourth volume, Application of Near-Infrared Spectroscopy in Biomedicine, balances the need for physical science/mathematics formalism with a demand for biomedical perspectives. Each chapter divides the presentation into two major parts: the first establishes the conceptual framework and describes the instrumentation or technique, while the second illustrates current applications in addressing complex biology questions. With the additional sections on further reading, problems, and references, the interested reader can explore some chapter ideas more widely.

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This reference gives food science professionals a working understanding of near-infrared spectroscopy (NIRS) and its role in maximizing food potential. It explains the technical aspects of NIRS, including: basic principles; characteristics of the NIR spectra; instrumentation; sampling techniques; and chemometrics. The book details applications of NIRS in agricultural and marine products, foodstuffs and processed foods, engineering and process monitoring, and food safety and disease diagnosis.

Over the past few decades, exciting developments have taken place in the field of near-infrared spectroscopy (NIRS). This has been enabled by the advent of robust Fourier transform interferometers and diode array solutions, coupled with complex chemometric methods that can easily be executed using modern microprocessors. The present edited volume intends to cover recent developments in NIRS and provide a broad perspective of some of the challenges that characterize the field. The volume comprises six chapters overall and covers several sectors. The target audience for this book includes engineers, practitioners, and researchers involved in NIRS system design and utilization in different applications. We believe that they will greatly benefit from the timely and accurate information provided in this work.

Rapid, inexpensive, and easy-to-deploy, near-infrared (NIR) spectroscopy can be used to analyze samples of virtually any composition, origin, and condition. The Handbook of Near Infrared Analysis, Fourth Edition, explores the factors necessary to perform accurate and time- and cost-effective analyses across a growing spectrum of disciplines. This updated and expanded edition incorporates the latest advances in instrumentation, computerization, chemometrics applied to NIR spectroscopy, and method development in NIR spectroscopy, and underscores current trends in sample preparation, calibration transfer, process control, data analysis, and commercial NIR instrumentation. This work offers readers an unparalleled combination of theoretical foundations, cutting-edge applications, and practical experience. Additional features include the following: Explains how to perform accurate as well as time- and cost-effective analyses. Reviews software-enabled chemometric methods and other trends in data analysis. Highlights novel applications in pharmaceuticals, polymers, plastics, petrochemicals, textiles, foods and beverages, baked products, agricultural products, biomedicine, nutraceuticals, and counterfeit detection. Underscores current trends in sample preparation, calibration transfer, process control, data analysis, and multiple aspects of commercial NIR instrumentation. Offering the most complete single-source guide of its kind, the Handbook of Near Infrared Analysis, Fourth Edition, continues to offer practicing chemists and spectroscopists an unparalleled combination of theoretical foundations, cutting-edge applications, and detailed practical experience provided firsthand by more than 50 experts in the field.

This book discusses the theory, instrumentation, validation, and implementation of near-infrared spectroscopy for pharmaceutical and medical applications. It showcases a diverse range of contemporary methods for the production, screening, and analysis of new drug products and pharmaceuticals. Presents current approaches in near-infrared spectroscopy (NIR) to monitor and control multiple phases of the drug manufacturing process.

This informative and state-of-the-art book on Infrared Spectroscopy is addressed to Researchers in Medicine as well as to Pharmaceutical Industry and Agriculture. It features 7 specialized chapters of MIRS and NIRS covering applications in proteins and biopolymers; food quality research and food safety applications; and medical applications, such as Down syndrome disorders of tooth, probing of brain oxygen, the role of CO<sub>2</sub> in blood pressure and diagnosis of metastatic cancer. This book highlights the span of modern Infrared applications.

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