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Introductory Chapter

Introduction to Infrared Spectroscopy in Life and Biomedical Sciences

Theophile Theophanides
National Technical University of Athens, Chemical Engineering Department, Radiation Chemistry and Biospectroscopy, Zografou Campus, Zografou, Athens Greece

1. Introduction

By 1950 IR spectroscopy was applied to more complicated molecules such as proteins by Elliot and Ambrose [1]. The studies showed that IR spectroscopy could also be used to study complex biological molecules, such as proteins, DNA and membranes and thus, IR could be also used as a powerful tool in biosciences [2, 3].

The FT-IR spectra of very complex biological or biomedical systems, such as, atheromatic plaques and carotids were studied and characterized as it will be shown in chapters of this book. From the interpretation of the spectra and the chemistry insights very interesting and significant conclusions could be reached on the healthy state of these systems. It is found that FT-IR can be used for diagnostic purposes for several diseases. Characteristic absorption bands of proteins, amide bands, O-P-O vibrations of DNA or phospholipids, disulfide groups, e.t.c. can be very significant and give new information on the state of these molecules.

Furthermore, with the addition of micro-FT-IR spectrometers one can obtain IR spectra of tissue cells, blood samples, bones and cancerous breast tissues [4-7]. Samples in solution can also be measured accurately. The spectra of substances can be compared with a store of thousands of reference spectra. IR spectroscopy is useful for identifying and characterizing substances and confirming their identity since the IR spectrum is the "fingerprint" of a substance.

Therefore, IR has also a forensic purpose and is used to analyze substances, such as, alcohol, drugs, fibers, hair, blood and paints [8-12].In the sections that are given in the book the reader will find numerous examples of such applications.

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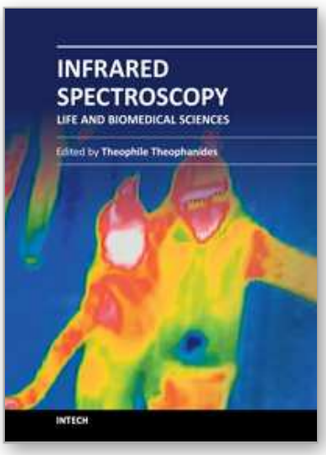

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This informative and state-of-the art book on Infrared Spectroscopy in Life sciences designed for researchers, academics as well as for those working in industry, agriculture and in pharmaceutical companies features 20 chapters of applications of MIRS and NIRS in brain activity and clinical research. It shows excellent FT-IR spectra of breast tissues, atheromatic plaques, human bones and projects assessment of haemodynamic activation in the cerebral cortex, brain oxygenation studies and many interesting insights from a medical perspective.

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