Joint Event

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Exploring the medicinal frontiers: Applications of Fourier Transform Infrared (FTIR) spectroscopy in biomedical investigations

Abstract:

Fourier Transform Infrared (FTIR) Spectroscopy, one of the optical spectroscopic techniques used in biophotonics, has emerged as a powerful analytical tool in biological and medicinal practices in recent years. FTIR spectroscopy, which can be combined with a microscope or Attenuated Total Reflectance (ATR) accessory, is based on analyzing the interaction between infrared light and the molecules in the sample to produce a highly specific spectrum. The resulting spectrum represents a fingerprint that can be used to extract valuable information regarding the molecular vibrations of functional groups and biochemical composition of the sample. The changes in the band intensities/areas of FTIR bands, bandwidths and shifts in the peak positions give important information about the functional groups of biomolecules. This technique allows the scanning of cells, tissues and biofluids in a very short time without introducing any foreign or disturbing probe into the system. It enables precise identification and characterization of biomolecules such as proteins, lipids, nucleic acids and carbohydrates within biological samples. Since the spectral parameters are sensitive to molecular changes caused by pathological conditions, by analyzing them subtle alterations can be discerned in biochemical compositions associated with different disease states. This capability has been used in the diagnosis of various diseases including cancer, diabetes, cardiovascular disorders and neurodegenerative diseases. In this talk, after giving general information about the principles of FTIR spectroscopy, experimental studies of my research group and other researchers will be summarized demonstrating the ability of this technique to detect and characterize pathological conditions in biological tissues.

Biography

Gulgun Cakmak Arslan is an Associate Professor in the Department of Biology at Duzce University, Turkey. She completed her Master's and PhD studies in the Molecular Biophysics Laboratory at the Middle East technical University. She published more than 20 papers, receiving more than 750 citations, related the use of various spectroscopic techniques including FTIR spectroscopy in the biological and medical materials. In recent years, she studies on the investigations of the effects of ionizing radiation and different toxic/antioxidant substances on biological tissues and membranes, oxidative stability of edible oils under storage and cooking conditions, protein structure, function and stability.