

Characteristic Features of IR Spectra of Serum in Multiple Myeloma Patients

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Multiple myeloma (MM) is a currently incurable oncohematological disease. MM accounts for approximately 10% of all hematological cancers, and 1% of all oncological diseases. MM is characterized by the formation in the bone marrow of clusters of malignant plasma cells that produce and secrete monoclonal immunoglobulins (M-proteins) or their fragments (k/λ light chains).

In this study we obtained and analyzed infrared (IR) spectra of serum from patients with multiple myeloma and healthy donors. Infrared spectroscopy is proved to be very promising approach for early cancer diagnostics. The IR spectra of blood serum demonstrate a complex pattern composed of numerous spectral features in mid-IR regions. Many of the maxima that are localized in the mid-IR region correspond to the vibrations sensitive to the secondary structure of proteins. Since development of MM is accompanied by decrease in level of serum albumin (HAS) and increase in concentration of immunoglobulins, a detailed analysis of these bands might be helpful for medical screening. Based on the analysis of the IR spectra of the serum in the range of 1700-1350 cm⁻¹ we have identified several spectral features whose positions and relative intensities appeared to be characteristic for MM samples. Possible application of this approach to the medical screening and monitoring is discussed.

Part of the work was performed using the equipment of the Research Park of St. Petersburg State University ("Centre for Optical and Laser Materials Research", "Centre for Diagnostics of Functional Materials for Medicine, Pharmacology and Nanoelectronics", "Cryogenic Department").