

## PROCESSING AND ANALYSIS OF IMAGES IN THE INTELLECTUALIZED LASER POLARIMETRY SYSTEM OF BIOLOGICAL OBJECTS

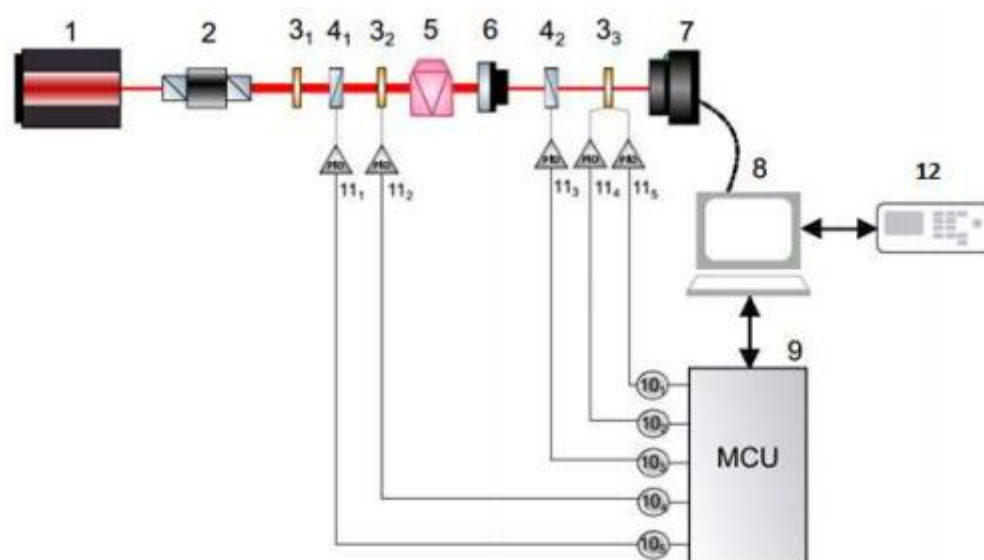
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### Abstract.

Functions, structural scheme and the main of the multifunctional intellectualized laser polarimetry system were considered in this paper.

**Keywords:** polarimetry, biological objects, diagnostics, Stokes parameters, Mueller matrixes

One of the promising directions of optical biomedical system of polarization diagnostics is a polarimetry system for processing and analyzing images of biological objects [1,2]. Intellectualized polarimetry system with the ability to implement twenty functions with different levels of information was developed: from measurement and analysis of distributions of Stokes parameters and Mueller-matrix elements of the investigated sample, to reproduction and analysis of orientational-phase parameters of anisotropy distribution of biological objects. The system consists of a measuring channel with the help of which new and improved methods of measurements of thin multilayer optical anisotropy biological object in the form of two-dimensional images were implemented, and the computer in which processing, analysis and classification of image data were realized (Fig. 1).



Semiconductor laser 1 with  $\lambda=0,638$  wavelength, collimator 2, quarter-wave plates  $3_1$ ,  $3_2$ ,  $3_3$ , a linear polarizer  $4_1$  and an analyzer  $4_2$ ; blood plasma sample 5, projection block 6, a CCD-based (charge-coupled device) camera 7, connected to the computer 8; special microcontroller control block 9, engine drivers  $10_1$ - $10_5$ , positioning control of engines  $11_1$ - $11_5$ , decision support block 12

Fig.1 Multifunctional automated system of 2D laser polarimetry [3].

The aim is to ensure the rapidity of the measurement and analysis of the obtained data and the reliability of the diagnostic methods. Required time operation characteristics of the specified system are provided by applying the principles of parallelism in the execution of basic image processing operations. Statistical,

correlational and fractal analysis of the obtained two-dimensional orientational-phase parameters distributions of anisotropy of investigated objects are used to determine informative attributes in their classification according to the specific nosology. Also the decision-making support for pathologies identifying based on the neural network method is considered.

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