Nanoscale physics

New possible method of evaluation of viral and bacterial infectivity

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It is well known, that absorption spectrum displays information on the composition of samples. Such parameters as molecular structure, dimensions of the components of the samples and others influence on the absorption spectrum of the sample. Optical studies are widely applied in biomedical studies [1], e.g. determining the bacteria concentration in the sample by measurement of its absorption at a certain wavelength. Consequently, it can be supposed, that optical measurements can be useful for determination of other parameters of the samples. Thus, for example, viral (bacterial) samples with different infectivity may have different absorption spectra.

As antiviral and antimicrobial therapy with nanoparticles is very relevant method [2], the study is performed with viral and microbial samples with nanoparticles. The experiments were carried out with Vesicular stomatitis Indiana virus (Rhabdoviridae), Lactobacillus delbrueckii and Saccharomyces cerevisiae preparations. As a nanoparticles the cerium dioxide nanoparticles were used. It was shown that nanoparticles change the absorption spectra of the sample much and these changes are correlated with the changes of the infectivity of the preparation.

This effect could be used for evaluation of the infectivity of different samples and for study of the mechanisms of the interaction between the bioobjects and nanoparticles. If absorption of the sample is presented in the form of combination of a finite number of oscillators [3], bacteria concentration and ratio of infectious to non infectious bacteria could be estimated by evaluation of oscillators strengths.

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