DIELECTRIC PROPERTIES OF THE MATRIX DISPERSED SYSTEMS WITH TWO-LAYERED INCLUSIONS IN THE MAXWELL-GARNETT APPROXIMATION

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Calculated dielectric losses in the matrix dispersed systems with two-layer spherical inclusions. In the approximation of Maxwell-Garnett made a detailed analys is of the dependence of the effective permittivity as the frequency of the external field and the parameters of the system.

Research dielectric loss (DL) in the matrix dispersed systems (MDS) devoted a significant amount. In some of these studies investigated the frequency dependence of the real and imaginary parts of the effective dielectric constant of such systems, depending on their physical and chemical characteristics, mostly studied (MDS) with a dielectric matrix with inclusions of different shapes and nature.

The main task in finding DLinMDSis the calculation of frequency dependence of the imaginary part of the effective dielectric constant in such systems based on their composition and structure and further calculating the value DL by the formula $W = \frac{1}{4\pi}\int_{\infty}^{\infty}\omega\left[\tilde{\varepsilon}''(\omega)\left|\mathbf{E}_{\omega}\right|^2 + \tilde{\mu}''(\omega)\left|\mathbf{H}_{\omega}\right|^2\right]\cdot d\omega$, where $\mathbf{E}_{\omega}$ і $\mathbf{H}_{\omega}$ -Fourier components and external fields, but also $\tilde{\varepsilon}''$ і $\tilde{\mu}''$ -according imaginary part of the effective permittivity and magnetic permeability MDS.

The purpose of research - calculation frequency dependence of the effective dielectric constant for MDS with double-layer spherical inclusions with leading anisotropic film.

The paper used mechanisms and patterns of absorption and scattering of electromagnetic radiation with double-layer spherical inclusions.

Methods for calculating the absorption of electromagnetic radiation in the matrix dispersed systems (MDS) with the multilayered inclusions (in our case, dual-layer) we will demonstrate in following the model system: two-layer spherical particles SiO_2 with a film of adsorbed water thick, placed in the matrix with a certaindielectric constant.It is known that the absorption of electromagnetic radiation in systems of this type are well defined imaginary part of the effective dielectric constant of the system.

The analytical dependence of the effective dielectric constant of system parameters: the relative contribution of the water in a separate colloidal silica particle and the degree of filling, completely solve the problem of dielectric losses of disperse systems.