

structural characteristics. The results of measuring the electrokinetic properties of quartz-like glasses obtained from MIP matrices showed that the values of the electrokinetic potential are higher for GBM than for glasses that are not bismuth-doped. For quartzoid glasses obtained from MAP matrices, a more complex dependence of the values of the electrokinetic potential on the composition of the glass is observed.

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VIP3

THE INFLUENCE OF *KCl* AND *NaCl* AQUEOUS ELECTROLYTES ON SURFACE CONDUCTIVITY OF DIAMOND PARTICLES

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Surface conductivity together with zeta-potential is an important property that helps us to study interface ionic composition and electric double layer of colloidal particles. According to the theory of electro-surface phenomena the particle polarizability value and its anisotropy can be represented as a function of their surface conductivity, size, shape factor and conductivity of media around the particle [1]. If particle polarizability is known the particle surface conductivity can be calculated. Experimental measurements of particle polarizability in different dispersion media are important to consider when studying the influence of dispersion media characteristics on surface conductivity of dispersed phase.

Here we present the results of measurements of diamond particle polarizability anisotropy and surface conductivity in aqueous univalent electrolytes of *KCl* and *NaCl*. In the conducted research diamond particles were approximated with ellipsoids of revolution with semi-axis length of 50 – 250 nm and semi-axis ratio of 2 – 1.5 in agreement with TEM images. Electro-optical technique was used to determine size and anisotropy polarizability distributions of particles in colloids. Particle anisotropy polarizability was experimentally determined by studying electro-optical effects in aqueous diamond colloids. Diamond aqueous colloidal systems under study were turbid. The intensity of transmitted light and transmitted light polarization was highly dependent on particle orientation order along the electric field applied to disperse systems. Extinction induced by the electric field was different and had different sign for incident light polarized along and across the applied electric field, which allowed us to measure conservative dichroism (CD) in the system. The CD study of average value of diamond particle polarizability anisotropy $\Delta\gamma$ is presented. The dependence of particle polarizability anisotropy γ on *KCl* and *NaCl* electrolyte concentration were experimentally determined at frequency range 0.1 kHz – 3.2 MHz of the applied electric field. The measured dependences of γ on the frequency of the applied electric field ν are in a good agreement with the ones calculated in frames of theory [1]. The values of particle surface conductivity at different concentrations of *KCl* and *NaCl* were computed based on their polarizability anisotropy. It was observed that at low electrolyte concentrations it is proportional to electrolyte concentration, which is in line with Henry law.

Conclusions. The theory of particle polarizability [1] used throughout these studies is applicable to the study of electric properties of diamond particles. The obtained diamond particle surface conductivity values are in good agreement with the values obtained earlier [2].

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VIP4

ELECTRIC POLARIZABILITY OF GRAPHITE NANOPARTICLES IN AQUEOUS POLYVALENT ELECTROLYTES

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Graphite particles of colloidal size are quite complex structures that include nanocrystals that are bonded with sp_2 -bonds. Nanocrystals of graphite consisting of several layers with high electric conductivity which exhibit special magnetic properties. The electrical and magnetic properties of colloidal graphite particles are affected by adsorption of molecules on their surface [1].

The purpose of the study was to determine the effects of the electric double layer created by ions of different valence on the polarizability anisotropy of graphite particles. According to the theory of dielectric particles polarizability in electrolytes, the dispersion of particle polarizability and its anisotropy are significantly influenced by the mechanisms of polarization of the diffuse part of the particle electric double layer [2]. According to theoretical calculations, the dependence of the average anisotropy of graphite particle polarizability $\langle\Delta\gamma\rangle$ on the frequency of electric field is nonmonotonic in the frequency range 0.5 kHz – 100 kHz. Using electrooptical technique, the dependences of $\langle\Delta\gamma\rangle$ on the frequency ν for particles in aqueous *KCl*, *BaCl₂*, *AlCl₃* and *Th(NO₃)₄* electrolytes with different concentrations were experimentally determined. The influence of the field frequency on the experimentally determined values of $\langle\Delta\gamma\rangle$ for graphite particles is much weaker than that observed in theoretically calculated dependencies. This indicates a weak influence of the diffuse part of the electric double layer of graphite particles on their polarizability, which is not typical for colloid particles of other nature. Dependences of $\langle\Delta\gamma\rangle$ on the concentration of electrolytes *KCl*, *BaCl₂*, *AlCl₃* and *Th(NO₃)₄* are significantly different. This indicates the dependence of the polarizability of graphite particles on the mechanism of adsorption of polyvalent ions on the particle surface. For *KCl* and *BaCl₂* electrolytes, the value of $\langle\Delta\gamma\rangle$ is proportional to the logarithm of electrolyte concentration. For *AlCl₃* and *Th(NO₃)₄* electrolytes, such a dependence is observed only after the isoelectric point. The obtained concentration dependences of particle polarizability anisotropy indicate a significant effect of the dense part of the electric double layer of particles on their polarizability, and point out to the similarities between the mechanism of adsorption of ions on the surface of graphite particles and the theory of gas adsorption on the surface of a solid.

Conclusions. The conducted studies show that the electro-optical technique can be effectively used to study the effect of adsorption of ions on the surface of graphite particles in electrolytes. The results of the studies confirm the assumption that the adsorption of molecules and ions significantly affects the electrical properties of graphite nanoparticles.

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