



“Hertz-to-infrared electrodynamics of single crystalline hexaferrites”

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DATA: DIA 19 DE SETEMBRO DE 2022 ÀS 14:00H

LOCAL: AUDITÓRIO MACKGRAPHE

Abstract: Interaction of condensed matter with electromagnetic radiation lays in the core of mostly all important technologies in our lives. Depending on the energy (or else, frequency) of the propagating wave, various fascinating phenomena (relaxations, soft modes, lattice coupled vibrations, etc.) come into scene. Some of the effects seemed to be independent, others are clearly in tight connection with each other. To have a deeper understanding of the physical processes taking place and to give explanation to some peculiar spectral observations one should go broadband. In this talk, a discussion will be given on a rich set of processes with different nature manifesting themselves in the ultra-broad frequency scale of 14 decades from radio range of units of hertz to the near infrared. The examined material, hexagonal ferrites, already being widely used on magnetic market, recently receives a plethora of attention from the scientific community for its' newly discovered outstanding terahertz properties and remarkable sensitivity of the functional characteristics to the chemical composition. All above provide a motivation for thorough study of the hexaferrite crystal family in a wide spectral range. We explain the mechanisms of all observed phenomena with proposed models.

“The use of terahertz and infrared spectroscopy to determine the properties of hydrating layers of bioorganic macromolecules”

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Abstract: Water is recognized now as the key factor controlling the structural and functional properties of bioorganic systems. At the same time, the set of methods that allow monitoring the state of water molecules and proton dynamics in the studied material is relatively limited. These are various types of vibrational spectroscopy (Raman, optical, neutron), as well as proton NMR and muon spin relaxation. Information obtained by other methods is even more indirect. Of these experimental approaches, classical vibrational optical spectroscopy, including the terahertz and infrared (THz-IR) frequency ranges, is the most easily accessible. In this talk, a discussion will be given on the latest results on the collective dynamics of water molecules and aqueous proton cations at the interface of various bioorganic systems (melanin, serum albumin, cytochrome c, extracellular bacterial filaments of electrogenic bacteria *Shewanella oneidensis*) obtained using THz-IR optical spectroscopy and inelastic neutron scattering under conditions of careful control of the hydration level