Nanocomposites and nanomaterials

Dielectric, mechanical and spectroscopy characteristics of "micro/nano cellulose + oxide" composites

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Cellulose matrix, especially micro/nano composites (MNC), now are under intensive studies as their perspectives spread from paper electronics and 3D printing to forensic examination and eco-friendly sorbents. In the work several sets of the composite samples, both MNC and MNC embedded with inorganic oxide dielectric (IOD) micro/nanoparticles were prepared and studied.

Thermo-mechanical and structural properties of the samples were studied. Various experimental techniques were used, e.g. dilatometry, differential scanning calorimetry (DSC), thermos-gravimetric analysis (TGA).

Morphology of the samples surfaces was investigated using optical and electronic microscopy.

Luminescent characteristics of initial and doped with IOD samples were taken and analyzed.

Temperature dependences of the specific capacity and dielectric losses tangent were measured in -100 – 100^0C temperature range when frequency of electric field varied from 1 to 100 kHz. As result, components of the complex dielectric permittivity, ε^*, σ_0 conductivity and other relaxation parameters were evaluated.

Summarizing mentioned data some conclusions about relation between structure and composition of the materials under study were made and perspectives of their applications were discussed.

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