

Nanocomposites and nanomaterials

Dielectric permittivity, and luminescence characteristics of “micro/nano cellulose + oxide” composites

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Nanocomposites are observed to be the materials of 21-st century in the view of possessing design uniqueness and property combinations that are not found in conventional composites. Composites on the base of 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. The aim of this work was to fabricate using cool-pressing procedure the set of “cellulose-oxide” micro/nanocomposite materials and to study their physical properties. The sets of like-to “ceramics” composite materials that consist of micro/nanocellulose and luminescent oxide vanadates, phosphates and zirconia particles were prepared. 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.

Morphology and structural properties of the samples were studied and various experimental techniques were used to do it,

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

Luminescent characteristics of starting and doped samples were taken and analyzed.

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