Nanocomposites and nanomaterials

Complex oxides as luminescent component of "polymer-oxide" micro/nano-composites

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Now, complex inorganic oxides are attentively considered as important components of polymer composites perspective for many practical applications. Opportunities to use such composites are related with peculiarities of micro/nano particles confinement in polymers. As for scientific point of view, current and future interest is in touch with effect of oxide particles on mechanical, thermo-mechanical properties, as well as their impact on dielectric and conductivity characteristics. Spectroscopic studies are one of the most important techniques that allow providing scientifically based prediction of mentioned materials properties. Particularly, when we speak about oxides that reveal luminescent behavior luminescent studies are of principal priority. The "polymer – oxides" composites, where oxides are capable to emit secondary light are attractive for applications as effective components of white light emission diodes, solar elements, etc.

That is why, several types of the RE-doped (RE = Eu, Sm, Pr) phosphates, vanadates, germinates and compounds with compose molecular anions (e.g. phosphate - molybdates, vanadates - molybdates, etc were selected as luminescent compounds.

The micro/nano sized powders of those oxides were synthesized by spontaneous crystallization, high temperature solid state reaction, co-precipitation and sol-gel methods.

Several polymers were used as matrixes and micro-cellulose was one of them.

The morphology of powders and composites was monitoring using optical, SEM and TEM microscopy.

The photo-luminescence (PL) properties were taken at UV and VUV pulse and stationary excitation and in wide temperature region 4.2 – 300 K.

The results and performed discussion confirmed previous predictions about perceptiveness of made composites for application as light transformers.