Preparation and caracterization of luminescent nanocomposite $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$

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In this report we present preparation and characterisation of the luminescent nanocomposite (NC) $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$. The initial powder materials As_2S_2 and $Eu(TTA)_2(Ph_3PO)_2NO_3$ were separately dissolved in the n-propylamine in a sealed glass containers under continuous ultrasonic stirring. In order to obtain nanocomposite materials with different content of Eu(III) different molecular weights of $Eu(TTA)_2(Ph_3PO)_2NO_3$ were mixed with As_2S_3 soluition.

Nanocomposite amorphous thin films $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$ were deposited on glass substrates by spin-coating method. All dissolution operations were carried out in a nitrogen-filled box. Amorphous NC films containing up to 15 at % of europium compound were obtained. The film thickness, determined by means of interferometry was found to be in the range 0.2 – 5.4 μm. The chemical and phase compositions of the films were determined by x-Ray diffraction (Cu Kα radiation, λ = 0.15418 nm). It is shown that the integrated photoluminescence intensity of the nanocomposite in thin film samples increases linearly with the concentration of the initial europium compound introduced. The thin films deposited by spin-coating were initially dried in vacuum at 60 °C for 1 h, and subsequently they were thermally treated at 180 °C for 30 min. They were characterized by measuring optical transmission (200 – 800 nm) as well as by photoluminescence spectroscopy (400 – 750 nm). Some of characteristic parameters, determined from experimental results are presented on Fig.1, 2 and in Table 1.

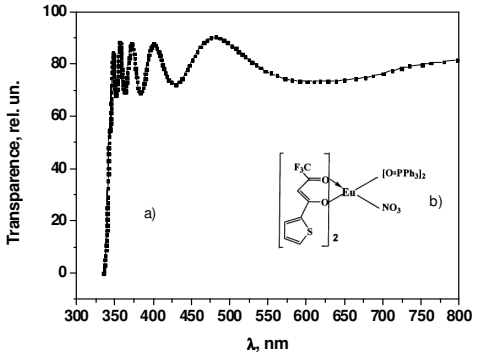

Fig. 1. Thin film transmittance spectrum (a) and the molecular structure of $Eu(TTA)_2(Ph_3PO)_2NO_3$ (b).

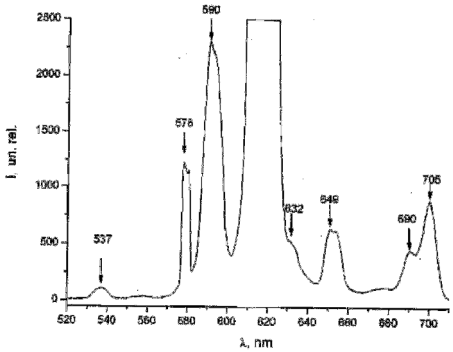

Fig. 2. Photoluminescence spectrum of NC thin layer $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$ at room temperature.

The nanocomposite material $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$ is expected to find applications in optoelectronics as optical recording media.

Table 1. The characteristic parameters of $As_2S_3/Eu(TTA)_2(Ph_3PO)_2NO_3$ thin layers

The content of the compound $Eu(TTA)_2(Ph_3PO)_2NO_3$ in the composite, (%)	The bandgap energy of the compound, (eV)	Position of the dominant PL peak, (nm)	Integrated intensity of the PL (500–750 nm), (rel. un.)
0	2.45	–	–
0.02	2.45	612	250
0.10	2.48	614	800
0.20	2.52	613	1200
1.00	3.52	612	2500

References:

[1] V.I. Verlan, M.S. Iovu, I. Culeac, Y. Nistor, C.I. Turta, V.E. Zubareva. Photoluminescence properties of PVP/Eu(TTA)$_2$(Phen$_3$PO)$_2$NO$_3$ nanocomposites. Journal of Non-Crystalline Solids, 357 (2011) 1004–1007.

Artificial neural network analysis of thermally stimulated depolarisation currents in Sb_2O_3-WO_3-Li_2O-Na_2O glasses

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The mixed alkaline effect (MAE) is a well-known anomaly in glasses. It results in a non-linear response of various physical properties on mixing of alkali ions in the glass. In this work, the thermal depolarization currents (TSDC) were studied in antimony oxides based glasses $60Sb_2O_3$-$20WO_3$-$(20-x)Li_2O$-xNa_2O (in mol%) for x= 0, 5,10, 15 a 20. TSDC methods are standardly used for characterization of different types of polarization in solids. Experiments on investigated glasses were performed at different polarization temperatures (90-200 °C) and polarization periods (10-100 min). Artificial neural network were used for results analysis. Prepared numerical model could be used for description of influence parameters of polarization and optimization of next measurements oriented on activation energies of ion polarization connected with local transport of electrical charge, Li+ and Na+ ions in this case.