New organic luminophore compounds - polymer nanocomposites: technology and absorbance

V. Verlan[1], M. Iovu[1], I. Culeac[1], A. Popushoi[2], G. Dragalina[2], S. Robu[2], N. Barbă[2], L.Malahov[3]

[1]*Institute of Applied Physics of Academy of Sciences of Moldova, 5 Academiei Str., MD-2028 Chisinau, Republic of Moldova.*
[2]*State University of Moldova, Nr 60 Mateevici Str., MD-2009 Chisinau, Republic of Moldova*
[3]*Institute of Mathematics of Academy of Sciences of Moldova, 5 Academiei Str., MD-2028 Chisinau, Republic of Moldova.*
Corresponding author: vverlan@mail.md

ABSTRACT

New light-emitting layers of nanocomposites on polymer base have been obtained. As polymeric matrices the copolymers of styrene and butilmetacrylate in the ratio (1:1) have been used. As organic luminophore compounds from izotiocianatopropenone and propenone classes were utilized. Transparent composite layers were deposited by spin-coating method on glass and quartz substrates. The morphological and optical properties of the obtained nanocomposites have been investigated. An intensive photoluminescence signal has been identified in green area of the spectrum. Nanocomposites are proposed for various practical applications.

Key words: Nanocomposite, organic luminophor, luminescence

1. INTRODUCTION

Nanocomposites (NC) based on polymers and organic luminophore compounds (OLC) are excellent materials for a new generation of light emitting devices with high efficiency due to strong luminescence, easy color tunability, temperature insensitivity, and high stability. There are real perspectives for their applications in different optical devices, for example, for preparation of different dyes and fluorescing devices (especial for fabrication of electroluminophor screens and fibers), of light amplifying devices, converters of the UV light in visible, etc.

The paper presents new results on thin film nanocomposites of organic luminophore-polymer compounds prepared by sol-gel method. The copolymers from styrene and butylmethacrilate (SBMA) in the ratio (1:1) with characteristic viscosity $\eta = 0.29$ dl were used as polymer matrix [1]. As organic luminophores compounds we have used 5 compounds of isothiocianatohalconic luminophore group of 3-(4-dimethylamino-phenyl)-1-(4-isothiocyanato-phenyl)-propenone which was obtained by condensation 1,1-dimetyl 3-(3- or 4–acetylphenyl) thiourea with substitution of aromatic aldehide.

2. METHODOLOGY

The organic luminophore compounds of 5 types from propenone and izotiocianatopropenone classes were obtained (Fig. 1). For synthesis of the 3-(4-(dimethylamino)phenyl-1-(4-izotiocianatofenil) propenone (2) have been used several ways of technology that include the elimination of dimethylamine propenone (1) and action with acidic agents. The most suitable reagent for obtaining of 3-(4-(dimethylamino) phenyl-1-(4-izotiocianatofenil) propenone (2) was the acetic anhydride [1, 2]. The propenone with thiourea groups were obtained with the addition of amine R'-NH_2 complexes to 3-(4-(dimethylamino) phenyl-1-(4-izotiocianatofenil) propenone (Fig.1). The addition of amines to NCS group was made at room temperature or at slight warming, without affecting propenononе groups. The end of reaction was determined by using of chromatography, following the consumption of izotiocianatopropenones. The structure of compounds nr.2 – nr.5 (Fig.1) was confirmed by elemental analysis, IR and NMR spectra and reactions to functional

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