

Stability of luminescent polymeric films under gamma-irradiation

Duclerc F. Parra ^{†*}, Hermi F. Brito ^{††}, Ademar B. Iugão [†].

[†]*Centro de Química e Meio Ambiente – IPEN/CNEN*

^{††}*Departamento de Química Fundamental – Instituto de Química da Universidade de São Paulo.*

* corresponding author : Av. Lineu Prestes, 2242, CEP:05508-900, Butantã, São Paulo - SP- dfparra@ipen.br.

Abstract

Polymeric luminescent devices are useful for many applications, however, few information has been reported concerning the stability under irradiation conditions. Luminescent films were synthesized from Triaquatris(acetylacetonate)europium(III) at 1, 5, 10 and 15% doped in diglycidylmetacrylic resin (DGMA). Films produced of the luminescent polymer were irradiated in a ⁶⁰Co source. Their luminescent properties, in the solid state, as well as, the thermal oxidative resistance after gamma irradiation was investigated. These systems were characterized by elemental analysis, thermogravimetry (TGA), differential scanning calorimetry (DSC) and infrared spectroscopy (FTIR). Based on TGA data, the thermal stability of DGMA:Eu(acac)₃x% system is similar to the polymer except in the highest concentration (15%). The DSC results indicate that those new systems are chemically stables and undergo the cure process before decomposition. The emission spectra of the Eu³⁺-acac complex doped in the DGMA recorded at 298 and 77K exhibited the characteristic bands arising from the ⁵D₀→⁷F_J transitions (J = 0-4). The luminescence intensity decreases with increasing of precursor concentration in the doped polymer. The system doped at low concentration (1%Eu³⁺-complex) presents more luminescence efficiency than those in 5, 10 and 15 %. After irradiation of the luminescent films the luminescence, thermal and oxidative properties were satisfactory

10020 ✓