Study of The Effect of Flux on Structural and Optical Properties of $Baal_2o_4:Eu^{2+}$ Phosphors

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Abstract

The concept of luminescence is widely used in our world today. There are different forms of luminescence which include chemiluminiscence, phosphorescence, florescence, and electroluminescence. When electrons in ground state are excited by energy, they move to higher energy states. when the energy is withdrawn, the electrons return to their ground energy state releasing energy in form of electromagnetic spectrum. Excited electrons of a phosphorescent material will undergo transition from singlet state to triplet state through intersystem crossing. Once the source of energy is withdrawn, the electrons will go back to ground state but in triplet form. The intersystem crossing is forbidden and only occurs in materials of specific crystalline structures. Due to the intersystem crossing the process of emission of spectrum takes longer than other forms of luminescence. Due to this factor, solid materials called phosphors have been synthesized to maximize the duration of light emission. These phosphors have been synthesized by doping materials with Europium or Dysprosium in the form of ions. The dopant will be excited in presence of a radiation to higher energy state and once the radiation is withdrawn it will return to ground state releasing light of different spectrum. These phosphors have their own optical and structural properties that are different from the components forming them. In presence of a flux these properties differ. A flux may affect the crystallinity, the incorporation of the dopant, duration of persistence of the luminescence, photoluminescence property or the decaying life time of the persistent luminescence. This flux maybe a solution such as Li_2CO_3 or Boric Acid. These fluxes have their own properties and they therefore act differently on phosphors. $BaAl_2O_4$ is doped with Eu^{2+} to give a phosphor. By adding flux, the intention is to focus on improving the duration and quality of emission of light as this is among the major studies in physics at the moment. These phosphors have a wide range of applications from glow-in-dark instruments, application in cathode ray tube of television and computers to light bulbs. Evolution of phosphors look into application of phosphors in painting where they are combined with paint using a binding agent, painted on walls to illuminate in the dark or at night as a means of saving electricity.