

Influence of Fe³⁺ on Photophysical Properties of Alq₃ Organic Nano Phosphors for Organic Light-Emitting Devices

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ABSTRACT

Organic materials are held together by Vander Waals forces between molecules and are therefore 'molecular solids'. The consequence of this molecular nature is that the luminescence process in organic materials is associated with the excited states of molecules. Pure Fe³⁺ transition metal doped with Alq₃ Complexes synthesized by simple precipitation method at room temperature, maintaining stoichiometric ratio. These complexes were characterized by XRD, and photoluminescence (PL) spectra. XRD analysis exhibits the poly crystalline nature of the synthesized complexes. The excitation spectra are in the range of 509 nm to 498 nm, and emission spectra in the range of 423 to 427 nm. Prepared organic phosphor is found in the nano range. It can be a suitable candidate for indigo-violet emitting OLED, PLLCD and solid-state lighting applications.

KEYWORDS: Transition metal, Nano organic Phosphor, Photoluminescence, FTIR, UV, OLED.

INTRODUCTION

The last few decades have seen dramatic changes in research on luminescence. There has been phenomenal growth in the subject, and a significant progress has been made in the field of luminescence research. Recent research is characterized by strong interaction among other branches of solid state and between different areas of luminescence using inorganic and organic materials. An organic light emitting material is attracted attention owing to their applications in OLEDs [1] for industry and academic research. It stimulates interest in next-generation displays and lighting technologies [2]. The efficient and stable tri (8-hydroxyquinoline) aluminum (Alq₃) is extensively studied for its high stability, good emission, easy synthesis, electron transport properties and high quantum efficiency. Alq₃ is attributed as electron transporting layer, as emission layer where green light emission is generated by electron-hole recombination in Alq₃. It also acts as host material for various dyes to tune emission color from red to green [3]. Although Alq₃ has low fluorescence efficiency, it has excellent properties as emitting material, namely high stable

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