

Synthesis, Characterizations and Applications of Organo-Rare-Earth-Metal Complexes for Organic Light Emitting Diode Applications

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Lighting technologies are an indispensable part of this era and cover a wide area in many fields such as primary lighting and lighting in imaging sectors. Among these lighting technologies, organic light emitting diodes (OLEDs) attract attention due to their low potential operation, easy application to large areas, flexibility, lightness and high resolution. On the other hand, it is seen in the literature that organometallic complexes synthesized by using transition metals and some rare earth metals operate with high efficiency. This study is initiated by the motivation to increase the diversity in OLED applications and to synthesize applicable electroluminescent organometallic materials with high performance criterias. While imidazole derivatives, which are known to emit blue light are easy to synthesize and derivatize, were chosen as organic components, Europium (Eu), Lanthanium (La) and Terbium (Tb) metals were preferred as metals to be used in organometallic complexes. Imidazole-derivatives, which have electroluminescence alone, are expected to have high-intensity and narrow emission band possessing emission in their metal complexes taking advantage of the shielding properties of electrons in the outer orbit of rare earth metals (REMs) and inhibition of f-f electron transition. Structural characterizations are done by using infrared (IR) spectroscopy, ¹H-NMR and ¹³C-NMR, optical characterizations are performed by UV-Vis spectroscopy (UV) and photoluminescence (PL) spectroscopy, electronical characterizations are completed by Cyclic Voltammetry (CV). Finally, the OLED applications has been completed and measured as external quantum efficiencies (EQEs), photoluminescence quantum yields (PLQYs), turn-on voltages and current density-voltage curves.

Key Words:

Organic Light Emitting Diode, Organometallic Complex, Rare Earth Metals, Imidazoles

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