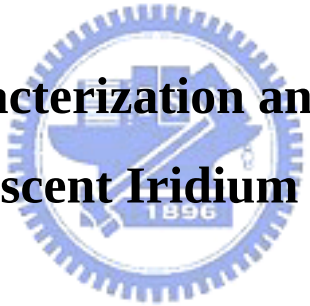
國 立 交 通 大 學

應用化學研究所

博 士 論 文

新穎銥磷光體之金屬化合物的合成、

特性鑑定與應用



Synthesis, Characterization and Applications of Novel Phosphorescent Iridium Metal Complexes

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中華民國九十六年一月

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ABSTRACT

This thesis is divided into eight chapters. The work presented here describes the development of novel phosphors, charge-carriers and charge-blockers for Organic light emitting device (OLED). The first chapter describes history of the choice of organic technology and the Early Years of Development**.** Chapter 2 how these devices work, how the materials affect device properties and energy transfer principles. Chapter 3 introduces the development of a series of 2-phenylbenzoxazole (bo) as the cyclometalated ligand with substituents (i.e., -CF_3, -F, -Me, -OMe) showing different electronic properties to synthesize mononuclear emissive complex with iridium(III) are reported in this chapter. Chapter 4 describes the research works of synthesis and Electroluminescence studies of the New Iridium(III) Complexes Posseessing the 2-Phenyl-1-pyrroline Ligands. Chapter 5 discusses the quantum efficiency properties of Ir complexes with red-orange emitting Ir(III) complexes. We demonstrate that the Ir complexes used as dopants in organic electrophosphorescent diodes exhibit very high PL quantum efficiency (η_{PL}) in the solid-state. We have also reported and rationalized a series of high EQE with varied dopant concentrations in a

device. Chapter 6 presents the study of white-Emitting Electrophosphorescent OLEDs. We have developed and fabricated highly efficient white organic light-emitting devices (WOLEDs) with very broad emission based on an orange emitter, bis-(4-triflurophenyl)benzothiozolato-N,$C^{2'}$) iridium (acetylacetonate) [Ir(4-CF_3bt)$_2$acac] and tri(2-phenylquinoline) iridium complexes. A white-light device with one of the highest EL efficiencies of 8.6 % with Commission Internationale d'Eclairage (CIE) coordinates of (x＝0.350, y＝0.396) has been demonstrated. Chapter 7 describes the investigation of the synthesis new dendrimer and properties of solution processable phosphorescent. We have pursued the development of highly luminescent solution-processible electrophosphorescent dendrimers. These dendrimers are characterized by high PL quantum yield (QY) vales than small molecules in the film. We also report the electrochemical, photophysical, and device properties of the dendrimer. The last Chapter 8 summarized all experimental results and future works in the dissertation.

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