

# Materials Science and Engineering Doctoral Defense

## Metal Complexes for Organic Optoelectronic Applications

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### abstract

Organic optoelectronic devices have drawn extensive attention by over the past two decades. Two major applications for Organic optoelectronic devices are efficient organic photovoltaics (OPV) and organic light emitting diodes (OLED). Organic Solar cells has been proven to be low cost, large area bulk processing possible and high absorption efficiencies compared to inorganic solar cells. Organic light emitting diodes are a promising approach for display and solid state lighting applications. To improve the efficiency, stability, and materials variety for organic optoelectronic devices, several emitting materials, absorbing materials, and charge transport materials were developed and employed in a device setting. Optical, electrical, and photophysical studies of the organic materials and their corresponding devices were thoroughly carried out. In this thesis, Chapter 1 provides an introduction to the topics presented. Chapter 2 discusses new porphyrin derivatives- azatetrabenzylporphyrins for OPV and near infrared OLED applications. Chapter 3, discusses synthesis, characterization, and device evaluation of a series of tetradentate platinum and palladium complexes, their use for single doped white OLED applications and RGB white OLED applications are explored. Chapter 4 discusses tetradentate platinum and palladium complexes as deep blue emissive materials for display and lighting applications.