

MASTER'S THESIS

Stacked organic light emitting diode

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Stacked Organic Light Emitting Diode

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Principal Supervisor: Prof. CHEAH Kok Wai

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Abstract

The aim of the project is to investigate and characterize Stacked Organic Light Emitting Diode (SOLED) and select the suitable connecting layer materials. SOLED is thin film device fabricated from organic materials with metal anode and cathode. Different from the conventional Organic Light Emitting Diode (OLED), there are more than one Light Emissive Units are connecting in series and partitioned from each other by at least one connecting layers. A number of research has been focused on materials used as the connecting layer (i.e. Charge Generation Layer, CGL). The material studied are limited to ITO, V_2O_5 , doped organic materials, $Mg:Alq_3/WO_3$, metal thin film with $LiF:Ca$. However, there are several metal-oxides that could be potentially used as CGL, due to their oxidizing power and n-type properties. To produce a high performance SOLED, the CGL material must match with the OLED materials, i.e. Hole Transport Layer and Electron Transport Layer. The understanding of the operating mechanism of the connecting layer (Charge Generation Layer) and SOLED is not well defined. The major goal of the present study is to explore and identify the most efficient charge generation layer materials for SOLED. The suitability and the effect of a variety of metal oxides, mainly the transparent conducting oxide of MoO_3 , Nb_2O_5 , Cu_2O , PbO and SiO_2 were studied. MoO_3 was selected to be the ideal CGL and the charge generation mechanism was investigated.

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