

# 設計與製作結合上發光有機電激發光元 及反射式液晶之透反式顯示器

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## 摘要

本篇論文中提出一以雙基板結合上發光式有機電激發光元件及反射式液晶之新型顯示器。此畫素結構的設計目的是以上發光式有機發光二極體替代傳統透反式顯示器中的背光系統。去除傳統背光系統，顯示器的厚度及重量可以被減輕，另外採用上發光式有機發光二極體可以提升顯示器開口率，免除畫素電路中電晶體數目對開口率的限制。傳統上，以四基板結合有機發光二極體及反射式液晶之透反式顯示器需要兩個畫素電路板進行驅動。然而，採取以雙基板結合上發光式有機發光二極體及反射式液晶的新型顯示器具有單一畫素電路板的優勢。本論文驗證並製作以雙基板結合上發光式有機發光二極體及反射式液晶之新式顯示器。並且根據已驗證新型顯示器，提出可同時驅動有機發光二極體及反射式液晶之畫素電路。考慮有機發光二極體元件及電晶體在製程中所產生的電性偏差及，畫素電路進一步設計來補償這些非理想效應。對於上述非理想效應，其模擬畫面均勻度可以分別提升至98.2%及99.1%。

# **Design and Fabrication an Emi-flective Display of Top Emission Organic Electroluminescence Devices and Reflective Liquid Crystal Displays**

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## **Abstract**

A novel hybrid pixel structure of top emission organic electroluminescence devices and R-LCD was proposed and demonstrated. The pixel structure was designed to replace the backlight system of conventional transfective display with OLED. Without the backlight module, the thickness and weight of the hybrid display can be reduced. Moreover, adopting the top emission OLED can enhance aperture ratio of the emi-flective display and relieve the limitation of the number of the TFTs in the pixel circuit. The conventional hybrid display with four substrates requires two circuitry planes to drive OLED and R-LCD. However, the emi-flective display with two substrates has the advantage of one circuitry plane. From the experimental results, the emi-flective display integrating top emission OLED and R-LCD was demonstrated with two substrates. With the demonstration of the emi-flective display, the pixel circuit was proposed. Considering the deviated electrical characteristics of OLED and TFTs, the proposed pixel circuit can compensate these unideal effects. The simulation results show the uniformity of 98.2% and 99.1% for the issues of OLED and TFTs respectively.