

高效率有機固態照明關鍵技術開發計畫(1)

執行單位

工研院綠能所

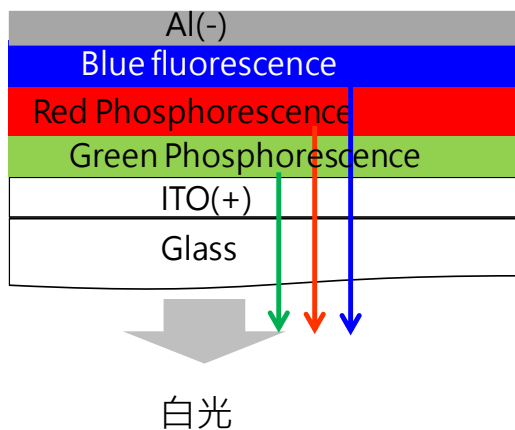
計畫主持人

陳世溥

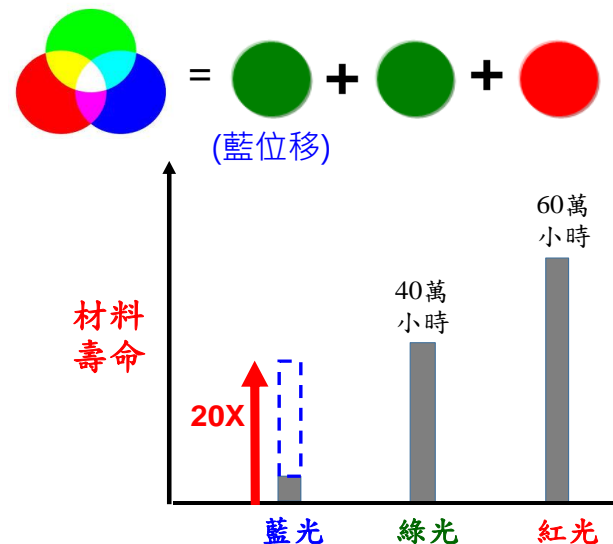
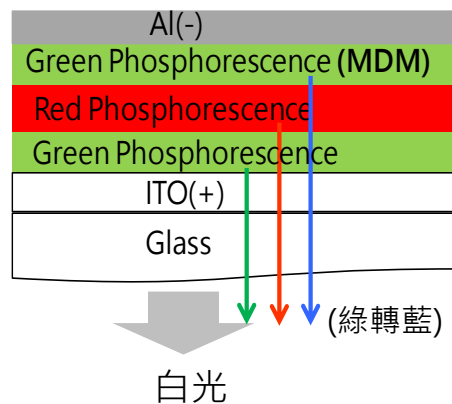
□ 關鍵專利技術

- 專利名稱/證號: 藍光發光元件及發光元件/ I575795
- 專利內容: 本發明以高效率且長壽命的綠色材料進行藍位移產生藍光，再加上其他色光組成白光元件，結構包含hybrid及tandem結構。本技術無藍光材料之白光OLED元件結構，可解決藍色磷光材料壽命短的產業瓶頸，同時可增加元件發光效率。本技術可應用於顯示及照明產業。

一般傳統 Hybrid OLED



PCOLED-(MDM 白光 OLED)



高效率有機固態照明關鍵技術開發計畫(2)

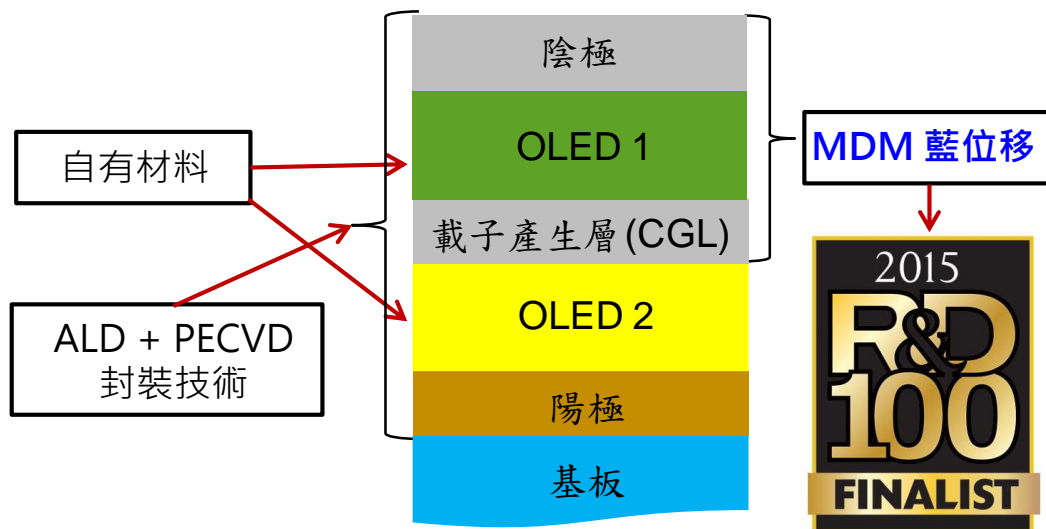
□ 技術說明

- 本計畫主要為整合各分項關鍵技術，完成具Tandem結構大面積無藍光材料之OLED白光模組，關鍵技術可分為高效率OLED照明材料技術、多模式OLED薄膜封裝製造技術、MDM表面電漿子關鍵技術及軟性彩色圖案化照明技術。

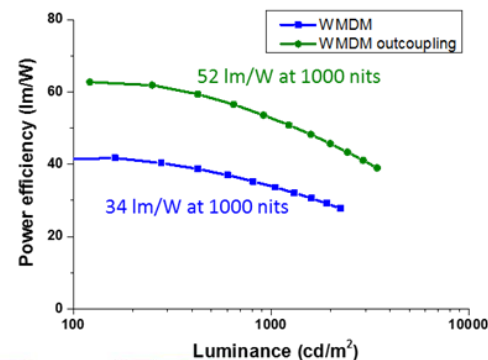
□ 技術發展現況

- 利用MDM表面電漿藍位移技術與串聯式(Tandem)結構進行大面積無藍光材料之白光元件製作。
- 白光模組面積150mm*50mm，效率可達52lm/W@1,000 cd/m²；壽命LT50@1000 cd/m²達23,452小時。其中MDM表面電漿藍位移技術，在2015年榮獲R&D 100國際獎項。

Tandem PCOLED結構



元件產品



The Key Technologies Development of High Efficiency Organic Solid State Lighting (1)

Execution Unit

Industrial Technology Research Institute

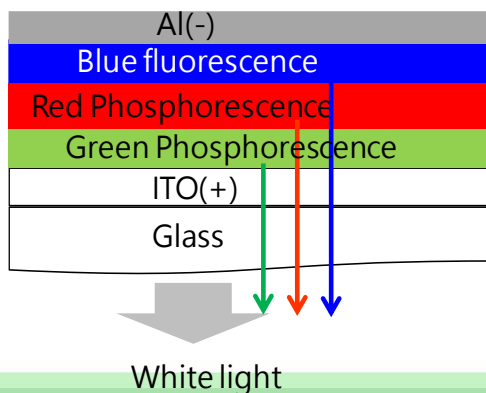
Project Director

Shih-Pu Chen

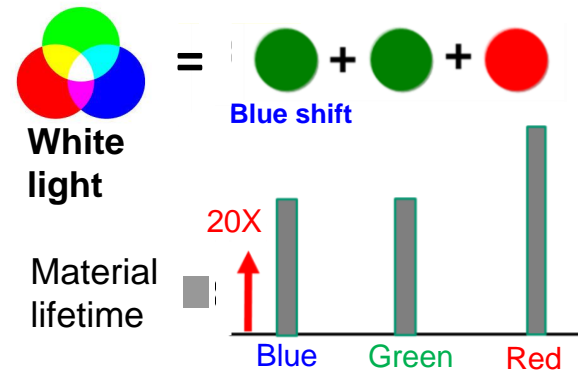
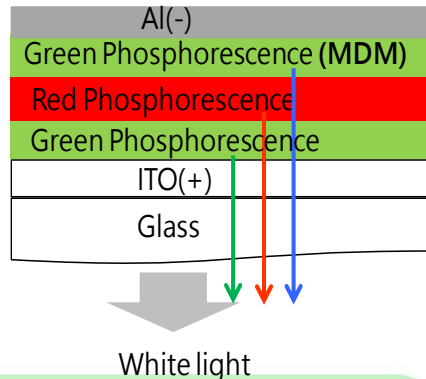
□ The Key Technology of patent

- **Patent/Pub. No.:** Blue Light Emitting Element and Light Emitting Element/ I575795
- **Content:** This invention makes use wavelength blue-shift device structure to produce blue light. Its emitting materials are high efficient and long lifetime green light-emitting materials. Furthermore, in hybrid or tandem OLED devices, white OLEDs can be produced by combining blue-shift structure and other colors, which do not include blue emitting material. The white OLED device without using blue light emitting materials could **overcome the industry bottleneck about the short lifetime** of blue light emitting materials, and then **enhance the device efficiency**. It can be applied for industrialization of OLED display and lighting.

Traditional hybrid white OLED



PCOLED (OLED device with MDM structure)



The Key Technologies Development of High Efficiency Organic Solid State Lighting (2)

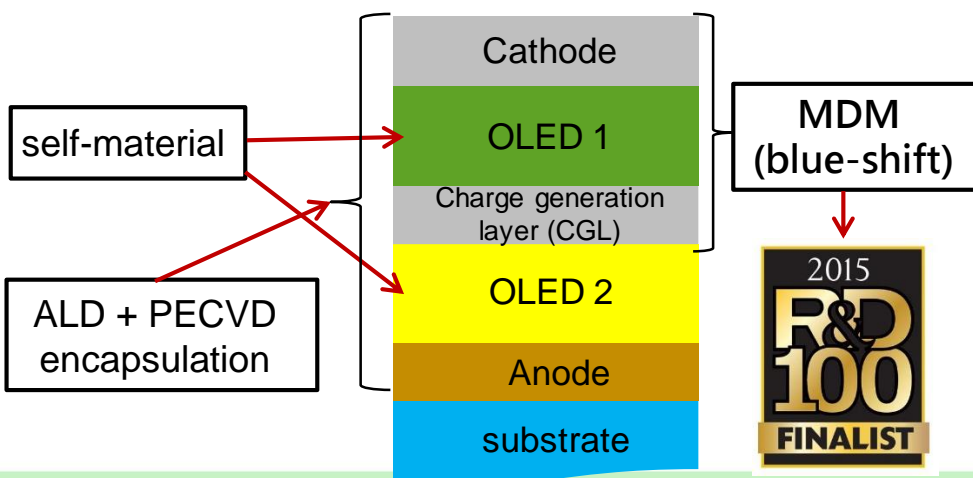
□ The technology of content

- In this project, the goal is to **integrate the key technologies**, which accomplished large area **white OLED lighting** module and application **with tandem structure**. The key technologies are included “High Efficiency organic solid state lighting device and material”, “Multi-mode of OLED thin film encapsulation”, “surface plasmon coupling with MDM structure” and, “flexible and color patterned OLED lighting”.

□ Current development of technology

- Large area white light OLED device without blue material was manufactured by integrating **MDM structure** and **tandem structure**.
- Large area(150mm*50mm) white OLED lighting module: Power efficiency: **52lm/W@1,000cd/m²**; Lifetime: **23,452hrs LT50@1000cd/m²**. The blue-shift technology of surface plasmon coupling layer with MDM structure won the R&D 100 Awards in 2015.

PCOLED with tandem structure



Production of WOLED

