

# 全球 OLED 顯示器關鍵製程先進技術專利 佈局之研究

## THE STUDY OF THE PATENT MAP OF GLOBAL OLED DISPLAY KEY PROCESS TECHNOLOGIES

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### 摘要

隨著科技、半導體、電腦的發展，顯示器應用範圍逐漸變廣，從基本平面顯示器，發展為各種特殊應用。市場實質與潛力都蘊含了巨大經濟效益，因此，政府在 2002 年提出「兩兆雙星」計畫，希望引導台灣經濟進入下個世代，其中，「兩兆」是指市值過兆元的半導體及顯示器產業。經過 20 年的發展，半導體產業似乎成為在世界的佼佼者；相對上，顯示器產業與產值的發展似乎不如預期，尤其是在新型態的 OLED 顯示器中，我國並未成為全球備受矚目的研發與生產重鎮。根據一般市場研究的論述，製程技術與其衍生的良率與成本等關鍵因素，直接決定了 OLED 顯示器產品的競爭力。因此，本研究擬定從全球 OLED 顯示器關鍵技術的專利佈局，尤其是有機層的製造步驟中，闡述我國產業的缺失。

本研究以全球專利資料、Espacenet 為研究範疇，針對關鍵技術進行完整的資料蒐集與分析，採用一般專利分析的檢索程序與分析方法，探討製程技術的分布狀況。依據產業分工的設備端、原料端、製程端為架構，分別揭示了製程技術有關專利主要受理局的狀況，其中，專利受理局主要集中在中、美、日、韓等國的專利局中，以推測申請人所重視的經濟活動市場。分析項目則包括主要申請人、申請人國別、專利分類號，據此更細部揭露其中的結構因素。另外，特別挑出主要競爭的美中兩個專利局受

理狀況，進行分析，並以該產業台灣的專利佔比，尤其製程端的專利說明台灣在此領域已失去主要的市場競爭地位。

本研究分析結果如下：第一、OLED 製程端的主要專利權人、申請人國別、專利局件數排名等狀況相似度高，主要參與者幾乎都為相同的廠商；第二、與製程端相比較，原料端與設備端廠商的專利件數較少；第三、根據過去的趨勢來看，可預期 OLED 製程技術主要擁有者仍然是韓國廠商，但會面臨中日廠商的競爭與挑戰，而市場不至於被三星、LG 所壟斷，因此推定 OLED 製程技術屬於寡占性的技術競爭局面；第四、台灣在 OLED 製程專利上的佈局明顯不足，且在此 20 年間的佔比無上升趨勢，此外，於 2000-2004 年間我國申請人專利佈局在趨勢/關鍵製程上佔比已有不足的潛在徵兆，反觀韓國在該些年度即積極發展製程技術，並取得專利，且逐年的佔比上升趨勢明顯。另外以市場面來看，根據(DisplayDaily, DSCC)，韓國的顯示器市場份額佔比 已呈現明顯優勢，若未來台灣廠商尤其製程端想與之競爭顯示器市場，除了專利趨勢上明顯劣勢，現今的市場份額亦呈現此一劣勢，未來更可能會受到大陸製程廠商的競爭。綜上所述，台灣在此領域已失去主導跟該產業競爭力，僅能作為部分參與者，以友達及群創為例或可轉攻少量、客製化、特定用途的 OLED 顯示器產線，或者與中日的廠商合作，進行技術交換、技術合作、專利授權等。

**關鍵字：**有機發光二極體、熱活化延遲螢光、噴墨列印、量子點、卷對卷加工

## ABSTRACT

This study takes GPSS and Espacenet as the research scope, conducts complete data collection and analysis for key technique, and uses general patent analysis retrieval procedures and analysis methods to discuss the distribution of manufacture technical patent. Among them, the patent offices are severely concentrated in the patent offices like China, the United States, Japan, Korea. To deduce the economic activity market that the applicant attend significantly. The analysis parts include the main applicant, the country of the applicant, and the IPC number, so as to reveal the structural factors in more detail. In addition, the two patent offices of the United States and China, which are the main competition, is specifically selected and analyzed. The proportion of Taiwan's patents in this industry, especially the patents at the manufacturing process, shows that Taiwan has lost its main market competitive position in this field.

The analysis results of this study are as follows: First, the main patentees of the OLED manufacturing process, the country of the applicant, the ranking of the number of patent offices, etc. are highly similar, and the main players are almost the same companies; Second,

compared with the manufacture side, the raw material and equipment side have fewer patents; Third, according to past tendency, it can be expected that the main owner of OLED manufacture technique will still be Korean companies, but they will face competition and challenges from China and Japanese manufacturers, and the market will not be monopolized by Samsung and LG. Therefore, it can infer that OLED manufacture technique is oligopolistic technological competition situation; Fourth, Taiwan's OLED manufacturing patent lackness is obviously insufficient, and the proportion has not increased in the past 20 years. In addition, the patent layout of Taiwan applicants from 2000 to 2004 has been insufficient in the trend/key manufacture process potentially. In contrast, South Korea was striking developed manufacture technique and obtained patents in those years, and the proportion has increased year by year obviously.

Futhermore, from the perspective of the market, according to (DisplayDaily, DSCC), South Korea's display market share has already shown a obvious advantage. If Taiwanese company, especially the manufacture side, want to compete with them in the display market in the future, apart from the obvious disadvantages in the patent results, the current market share also presents this disadvantage, and it need to be faced competitive by mainland manufacturers companies in future. To conclusion, Taiwan has lost its dominance and competitiveness ability in this field, and can only be a part of the participants. For AUO and Innolux as examples, it may turn to small-scale, customized, and specific-feature OLED display production lines. Or cooperate with Chinese and Japanese manufacturers to conduct technical exchange, technical cooperation, patent licensing, etc.

**Keywords:** OLED, OLED Process, TADF, Ink-Jet, Quantum Dot, Roll to Roll