

智慧光環境關鍵模組開發與應用計畫

執行單位

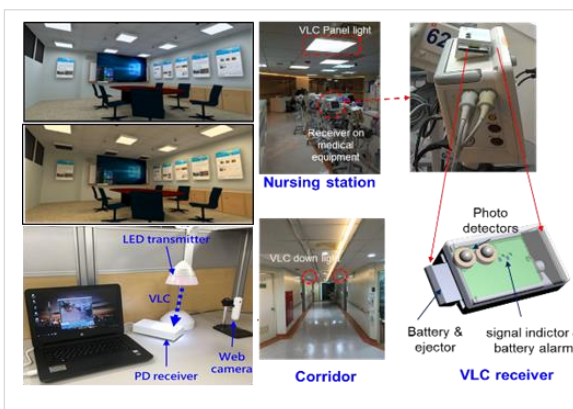
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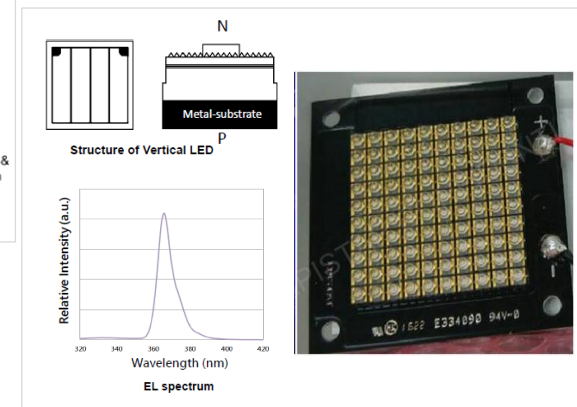
朱慕道 組長

- LED智慧光環境關鍵技術：開發智慧光模組、人因照明模型、雲端控制、可見光定位與傳輸等技術，建構最適化光環境應用模式，可擴大應用至辦公室、教室、醫院、商場與健康照護等場域。
- 高功率氮化鋁LED光源模組技術：有效提昇LED發光效率與使用壽命，未來可協助國內LED廠商開發超高功率垂直結構LED晶片，藉此拓展AlN封裝散熱基板與三維陣列LED的應用範圍。

- 佈局智慧光環境之同色異譜、光色調控、回饋控制等重點專利家族，因應不同的光環境場域進行人因照明參數調控。
- 可見光定位系統，伺服器藉由接收端與無線收發元件耦接，取得辨識碼後，藉以對該定位收發元件在該燈具所定義的空間中定位。
- 採用氮化鋁晶圓級基板配合3D via-hole結構設計，提昇基板封裝散熱性能。並聚焦高功率LED模組，導入晶圓級氮化鋁封裝基板，進行系統應用載具能量開發，加速產品應用專利佈局。



整合相關技術，導入辦公室、醫療照護等場域，提升智慧光環境之應用價值



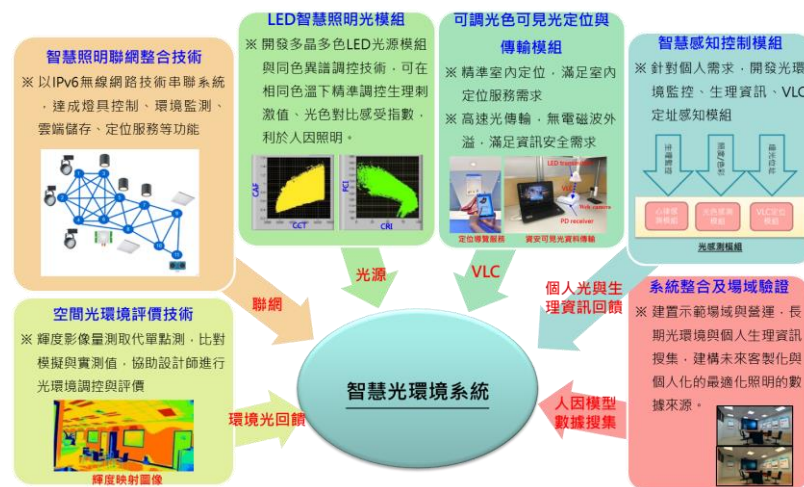
高功率氮化鋁 LED 光源模組

開發智慧LED光環境照明所需之關鍵模組技術，整合跨領域技術建構可因應人、事、時、地進行照明光調變的智慧光環境系統，進而鏈結全球智慧平台與物聯網產業資源，引領我國LED照明整合智慧應用系統產業朝向高值化發展。另，開發高導熱晶圓級氮化鋁封裝基板之關鍵金屬化封裝技術，有助於提升我國在半導體與綠能電子元件之產業技術及應用市場。

■ 開發智能校正高色彩精準光源模組，LED具備廣色域及同色異譜能力，可因應光環境場域進行人因照明參數調控。

■ 開發兼具照明/傳輸/定位等功能之可調光色可見光定位與傳輸模組，使用雙通道高低色溫LED組合，提升LED照明頻寬與傳輸速率。

■ 開發高效率LED封裝材料技術，配合高功率氮化鋁LED光源模組之最適化封裝應用測試，提昇LED光源穿透率與發光角度。



Integration of cross-cutting technologies to build a smart light environment system that can be automatically tuned

Key Modules Development and Application of Smart Lighting Environment

Execution Unit

Electronic and Optoelectronic System Research Laboratories, ITRI
Chemical Systems Research Division, NCSIST

Project Director

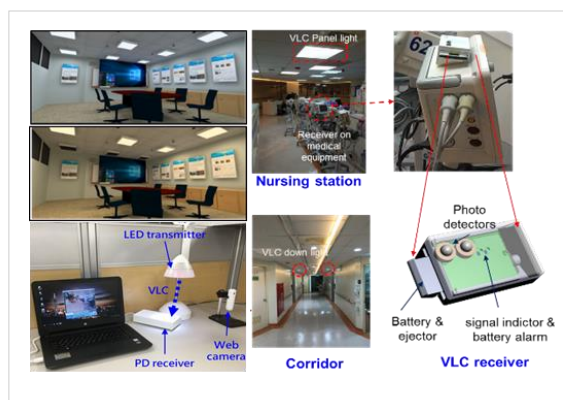
James, Mu-Tao Chu. Division Director

- LED smart lighting environment: develop intelligent lighting modules, human centric lighting models, cloud control system, and visible light communication (VLC) technologies to build up the most suitable lighting environment in workplace, classrooms, hospitals, shopping malls and health care applications.
- High-power AlN LED light module: effectively enhance the LED luminous efficiency and service life, assist the domestic LED manufacturers in developing ultra-high power vertical LED chip, thereby expanding the applications of AlN thermal dissipation substrate and the three-dimensional LED array.

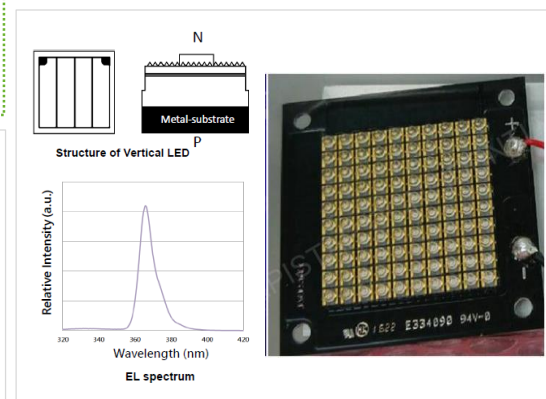
- Strengthen the patent portfolio in metamerism, CCT control, sensor feedback control ...etc , and adjust the human centric lighting recipes according to different field needs.

- The VLC positioning system server receives the signal from transceiver components which are embedded in the lighting fixture modules to identify the accurate location of objects under the lighting fixtures.

- Enhance the thermal performance of package substrate by using wafer-level AlN substrate with 3D via-hole structure design. Introduce wafer-level AlN package substrate into high-power LED modules for system verification, and thereby promote the layout of Patent Portfolio.



Integrate relevant technologies, import offices, medical care and other fields to enhance the value of intelligent lighting environment



High-power AlN LED light module

Develop the key component technologies of LED smart lighting, and integrate cross-technologies to build up an adjustable lighting environment to deliver the right light, in the right place, right time, for the right people. Further linking the global intelligence platform and Internet of Things industry, transforming Taiwan's LED lighting industry into value added application system integration. In the other hand, the critical development of metallization package for high thermal conductivity wafer-level AlN substrate is beneficial to promote the technological capability and application markets in domestic industry for semiconductors and green energy electronic components.

- Development of intelligent color correction light modules with high-precision and wide color gamut with metamerism, to provide intelligent human centric lighting.
- Development two-channel dimmable LED VLC lighting modules with illumination, positioning, and data transmission functions.
- Development of high-efficiency LED packaging materials and packaging optimization of high-power AlN LED light modules is useful to enhance LED light transmittance and light angle.



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