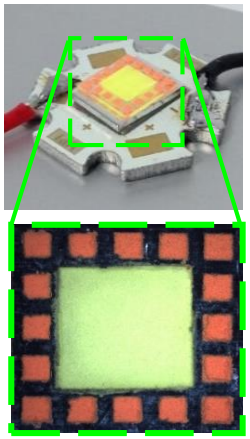
室內高演色性節能照明

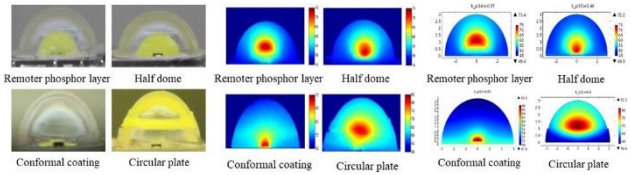
執行單位	國立中央大學 光電科學研究中心	計畫主持人	劉正毓 教授

- 本計畫開發出陣列式螢光粉封裝技術，色溫於 6500 K可得封裝效率達到 63%，演色性 91，若以業界封裝效率定義來估算，扣除掉 17.08% 的 Stoke's loss後，所產生之封裝效率可高達 80.08%。本計畫亦開發圖案化藍寶石基板、低溫低熱阻之錫鉍共晶固晶材料、新式高效能驅動模式與螢光粉熱分析，這些技術可讓LED的各項應用達到穩定效果並提升台灣在LED產業的國際競爭力。

本計畫105-106年度共獲得10件國內外專利，申請專利如下：
(1) 孫慶成，LASER STIMULATED WHITE-LIGHT LIGHTING SYSTEM，美國專利 (申請中，申請案號：15/153,897)
(2) 孫慶成，ACTIVE BLUE LIGHT LEAKAGE PREVENTING LED STRUCTURES，美國專利 (申請中，申請案號：15/167,455)
(3) 孫慶成、張育譽、鐘翌菁，液冷式高功率 LED 投射灯，中國發明專利 (申請中，申請案號：CN 106287329 A)
(4) 孫慶成，雷射激發之白光照明系統，中華民國專利 (申請中，申請案號：105109214)
(5) 孫慶成，主動式抑制藍光溢漏之 LED 結構，中華民國專利 (申請中，申請案號：105107096)
(6) 孫慶成、張育譽、鐘翌菁，液冷式高功率 LED 投射燈，中華民國專利 (領證中，申請案號：104117998)



	Experiment
Bare of Radiant Flux [mW]	77.47
Radiant Flux [mW]	49.16
Package Efficiency [%]	63.45
CRI	91.06
CCT [K]	6441.27
CIE x	0.321
CIE y	0.347



- 本計畫開發出陣列式螢光粉封裝技術，當色溫在 6500 K 時，可得封裝效率達到 63%，且演色性達 91 之實際封裝，其色座標點誤差小於 0.015，若以業界封裝效率定義來估算，扣除掉 17.08% 的 Stoke's loss後，本計畫所產生之封裝效率可高達 80.08%，此技術將可大大提升台灣在LED產業的國際競爭力。本計畫亦開發低溫低熱阻之錫鉍共晶固晶材料，經過冷熱衝擊(-45 °C 至125 °C，200次循環)與燒測(通以高電流一周(1 安培))後，其推晶強度皆能大於5 kg。而本計畫之LED螢光粉熱效應之系統性研究，建立此量測系統後，將可直接進行各種封裝技術之評估，並可對國內廠商進行服務。LED新式高效能驅動模式之開發，建立此新驅動模式後，將可直接應用於各式LED之驅動，除可突破專利限制外，實用上也可讓LED的各項應用達到不同的穩定效果，更有助於智慧照明中的LED各種變化切換，這些技術將可大大提升台灣在LED產業的國際競爭力。

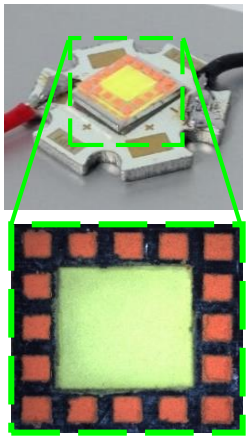
High energy saving and extreme CRI indoor lighting

Execution Unit	National Central University, Optical Sciences Center
Project Director	Prof. Cheng-Yi Liu

- This two-year project develops the novel packaging techniques. The packaging efficiency is about 63% and CRI is 91 at color temperature of 6500 K. However, the packaging efficiency is up to 80.08% by industrial calculation which don't consider the Stoke's loss. This project also develops innovative techniques such as (1) pattern sapphire substrate for well-controlled light pattern, (2) die attach technique with low thermal resistance, (3) the design of electronic controller for high-power LED, and (4) theoretically analyze the thermal effect of phosphor. There techniques are to produce the next generation emitter to replace fluorescent light tubes and become the primary light source in the world.

This two-year project obtains 10 patents. The Patent pending is as follows:

(1) LASER STIMULATED WHITE-LIGHT LIGHTING SYSTEM, USA
(2) (2) ACTIVE BLUE LIGHT LEAKAGE PREVENTING LED STRUCTURES, USA
(3) 液冷式高功率 LED 投射灯, China
(4) 雷射激發之白光照明系統, Taiwan
(5) 主動式抑制藍光溢漏之 LED 結構, Taiwan
(6) 液冷式高功率 LED 投射燈, Taiwan



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