



The Study of Planar Lighting Using Remote Phosphor Wavelength Conversion



以分離式螢光粉波長轉換機制所形成平面光源技術之研究

Student: Hsin-Tao Huang (黃信道) 博四

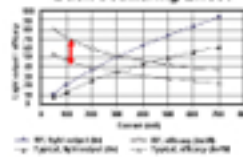
Advisor: Chuang-Chuang Tsai (蔡焜焜), Yi-Pai Huang (黃乙白)

國立交通大學 光電工程研究所

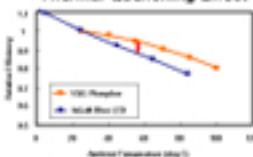
The planar lighting system (RPC lighting) uses blue LEDs to excite a YAG:Ce³⁺ yellow phosphor film remotely, yielding a high lumen efficiency with uniform and planar light-emission. The phosphor film herein acts as a wavelength converter and a light diffuser simultaneously. Eventually, the proposed configuration can yield higher lumen efficiency, less angular color deviation and uniform luminous distribution at an ultra-slim structure.

Motivation

Back Scattering Effect



Thermal Quenching Effect



- (1) N. Narendran et al., *phys. stat. sol. (a)* 202, No. 8, 2005
- (2) C. Hoelen, et al., *Proc. of SPIE*, Vol. 3058, 2005
- (3) J. K. Kim et al., *Jpn. J. Appl. Phys.*, Vol. 44, 2005
- (4) H. Luo et al., *Appl. Phys. Lett.* 86, 2005

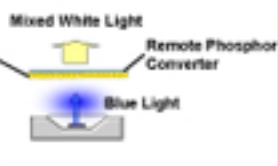
- (1) Y. Ito et al., *SID Symp. Dig. Tech. Paper*, 2008, pp. 864-869
- (2) C. H. Tien et al., *Proc. of SPIE*, Vol. 7617, 2010

Principle

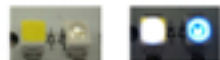
Conventional Dispensing



Remote Phosphor

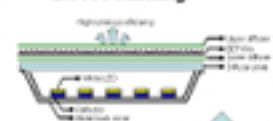


High Operated Temperature

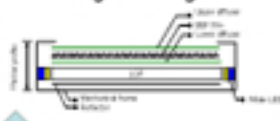


Objective

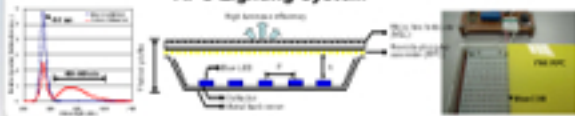
Direct-emitting



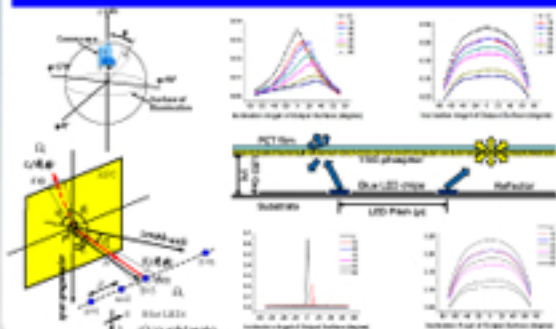
Edge-emitting



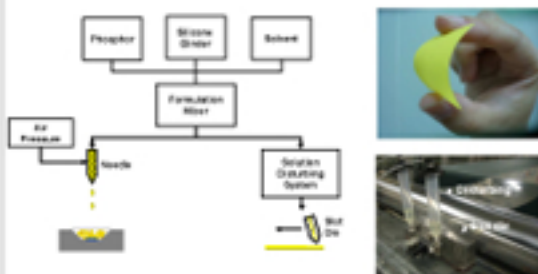
RPC Lighting System



BSDFs Measurement & Simulation



Experiment Setup



Conclusion

