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The Optimization of the White Light-Emitting Diodes by Quantum Dots, Polymers and Photonic Crystals

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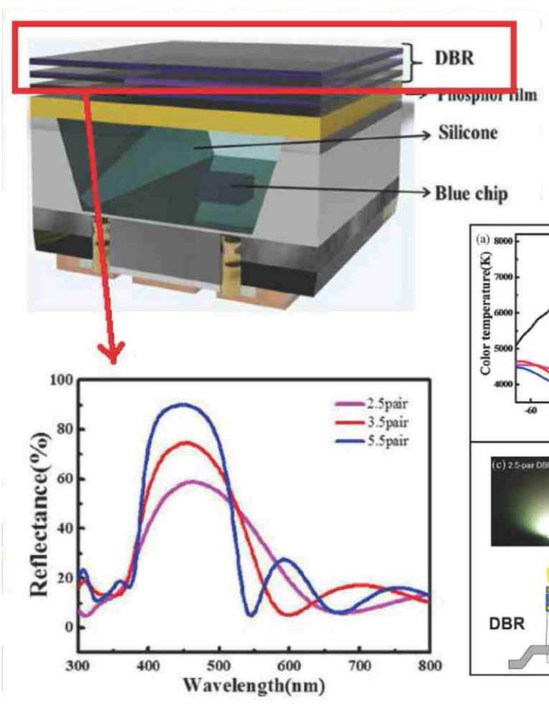
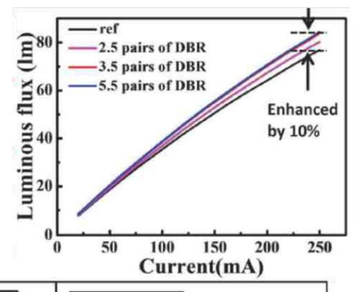
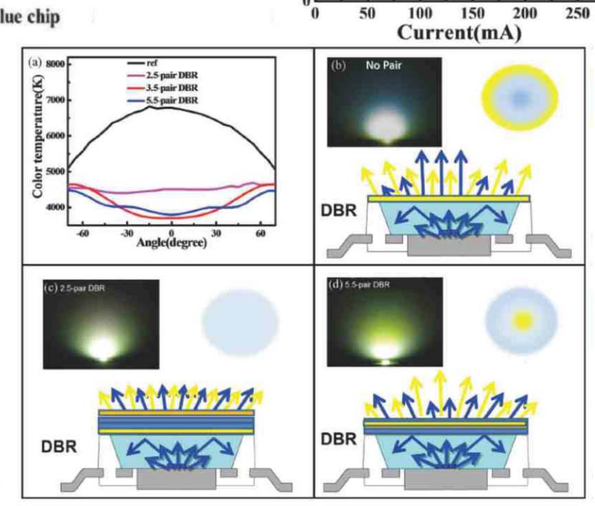
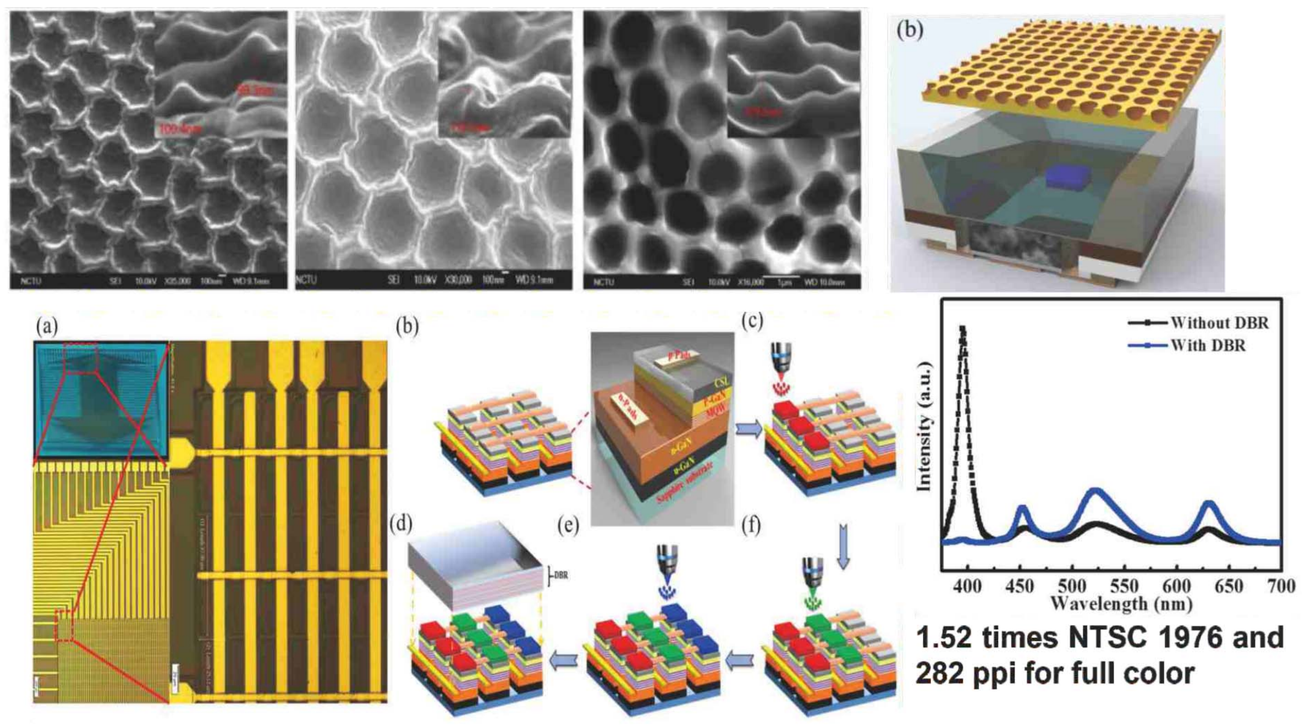
光子晶體應用研究重點

This study demonstrates the 1D photonic crystal: DBR structure and quasi photonic crystal: nano-honeycomb structure to optimize w-LEDs that the CCT deviation can be improved and the luminous flux increases more than 10% due to the enhancement of the light extraction of the blue light. When the DBR structure combined with the quantum dots (QDs) micro-display device, the enhanced luminous flux is 194 % (blue), 173 % (green) and 183 % (red) more than that of the samples without the DBR structure.



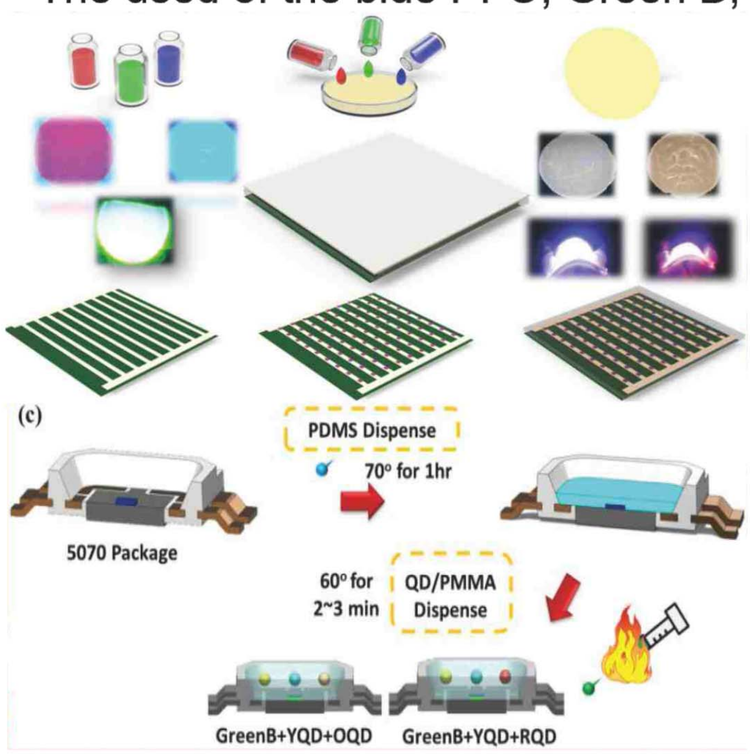


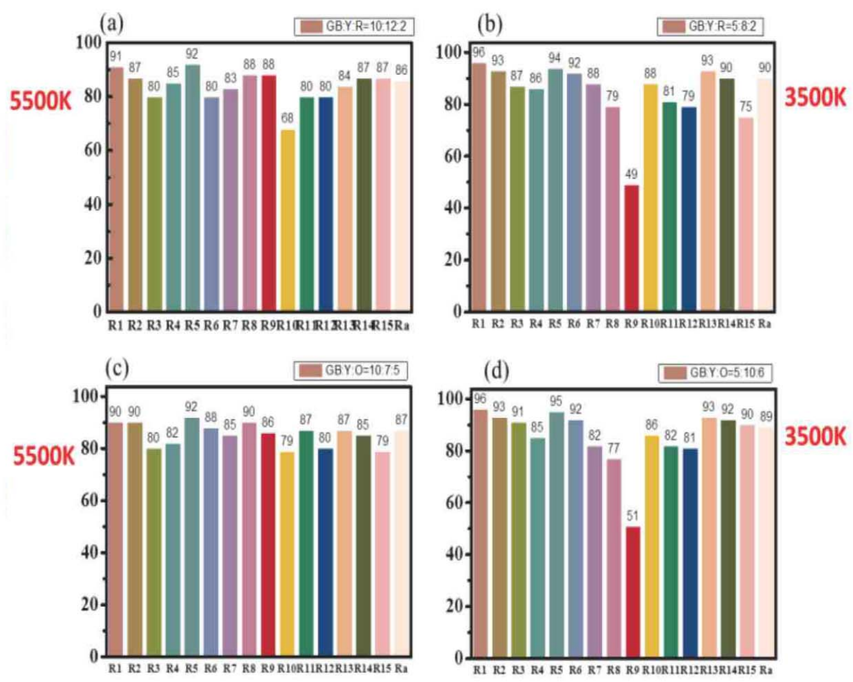




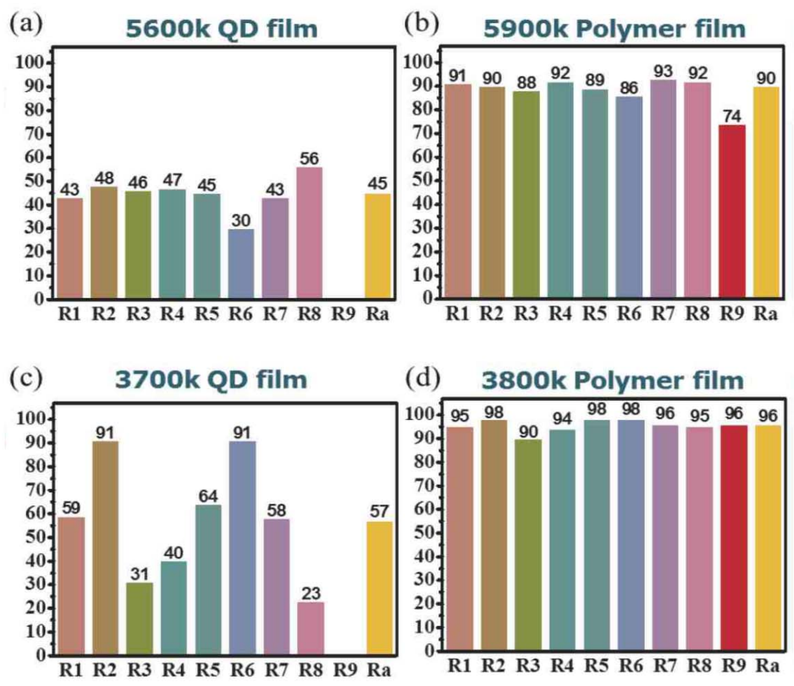
1.52 times NTSC 1976 and 282 ppi for full color

Besides the color uniformity and the luminous efficiency, the color rendering index (CRI) is also the important issue of w-LEDs. This research also proposed the hybrid Green B and quantum dots structure of the w-LEDs to improve the CRI (90). The used of the blue PFO, Green B, and PFO-DBT could achieve the CRI (95) and excellent CIE R9 of flexible w-LEDs.





CRI and R9 for hybrid green B and QD



CRI and R9 for pomer flexible

研究生活及心得

在學習以及實驗的過程中，遭遇到了許多挫敗、瓶頸，但在不斷的參閱書籍文獻及同學、學長姐、老師們細心、不厭其煩的教導與討論下，學到了許多知識及寶貴的經驗，這過程中的酸甜苦辣使我體會作學問時一個深刻的經驗。人生是一連串連續的累積過程，一時的失敗難過終究會過去，下次又是一個可以挑戰把握的機會。