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單晶片量子點混合型微型發光二極體全彩畫素陣列

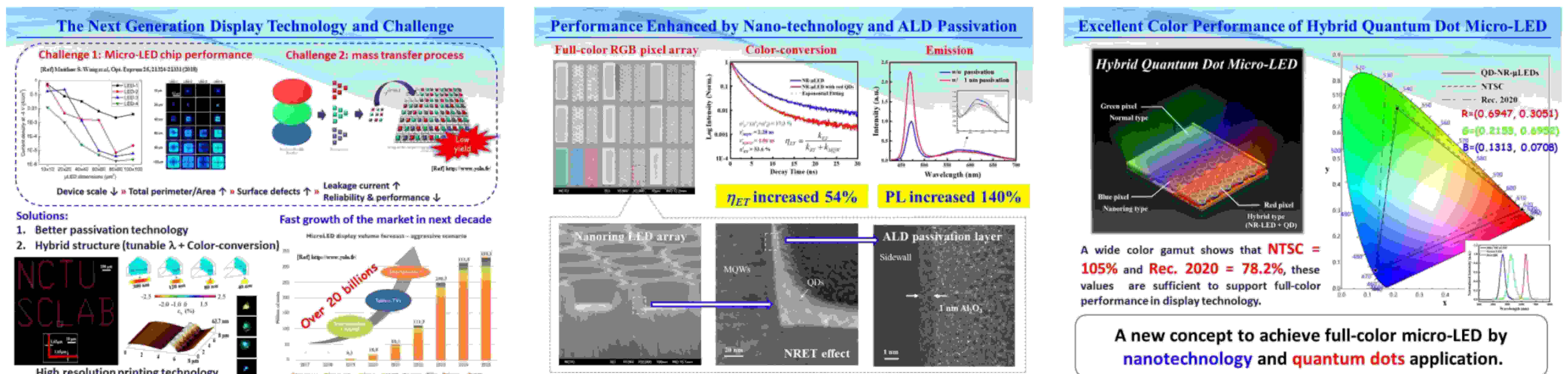
Full-color Pixel Array Fabricated by Monolithic Hybrid-type Quantum Dots Micro-light-emitting Diodes

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研究重點

Full-color displays based on micro light-emitting diodes (μ LEDs) can be fabricated on monolithic epitaxial wafers. Nanoring (NR) structures were fabricated on a green LED epitaxial wafer; the color of NR- μ LEDs was tuned from green to blue through strain relaxation. An Al_2O_3 layer was deposited on the sidewall of NR- μ LEDs, which improved the photoluminescence intensity by 143.7%. Coupling with the exposed multiple quantum wells through nonradiative resonant energy transfer, red quantum dots were printed to NR- μ LEDs for a full-color display. To further improve the color purity of the red light, a distributed Bragg reflector is developed to reuse the excitation light.

研究成果



[Ref] Sung-Wen Huang Chen, C.-C. Shen, T.-Z. Wu, Z.-Y. Liao, L.-F. Chen, J.-R. Zhou, C.-F. Lee, C.-H. Lin, C.-C. Lin, C.-W. Sher, P.-T. Lee, A.-J. Tzou, Z. Chen, and H.-C. Kuo, "Full-color monolithic hybrid quantum dot nanoring micro light-emitting diodes with improved efficiency using atomic layer deposition and nonradiative resonant energy transfer," *Photonics Research*, vol. 7, no. 4, pp. 416-422, 2019.

研究生生活與心得

博士研究生涯至今三年半以來，每天都是非常忙碌且充實的生活，胡適先生說過：「種種從前，都成今我。莫更思量莫更哀，從今後要怎麼收穫，先那麼栽！」，這句話是我學習生涯以來最大的體悟，唯有不斷的付出與努力實踐，才能享有豐收的果實。學習的道路上，保持積極樂觀的態度是我的處事方針，我喜歡學習新知，當面對問題時，時常告訴自己要充滿好奇心，才能從更多面向看到關鍵所在。感謝我的指導教授郭浩中博士，給與研究團隊充分的建議與資源，讓我們能沒有後顧之憂的朝目標前進；感謝實驗室過去所有一起打拼的夥伴們，沒有你們的教學相長與努力付出，就沒有今天的成就；感謝我的家人，作為我最堅強的後盾，時時鼓勵我，讓我充滿繼續邁步向前的能量；最後感謝一路上幫助過我的所有人，謝謝。



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