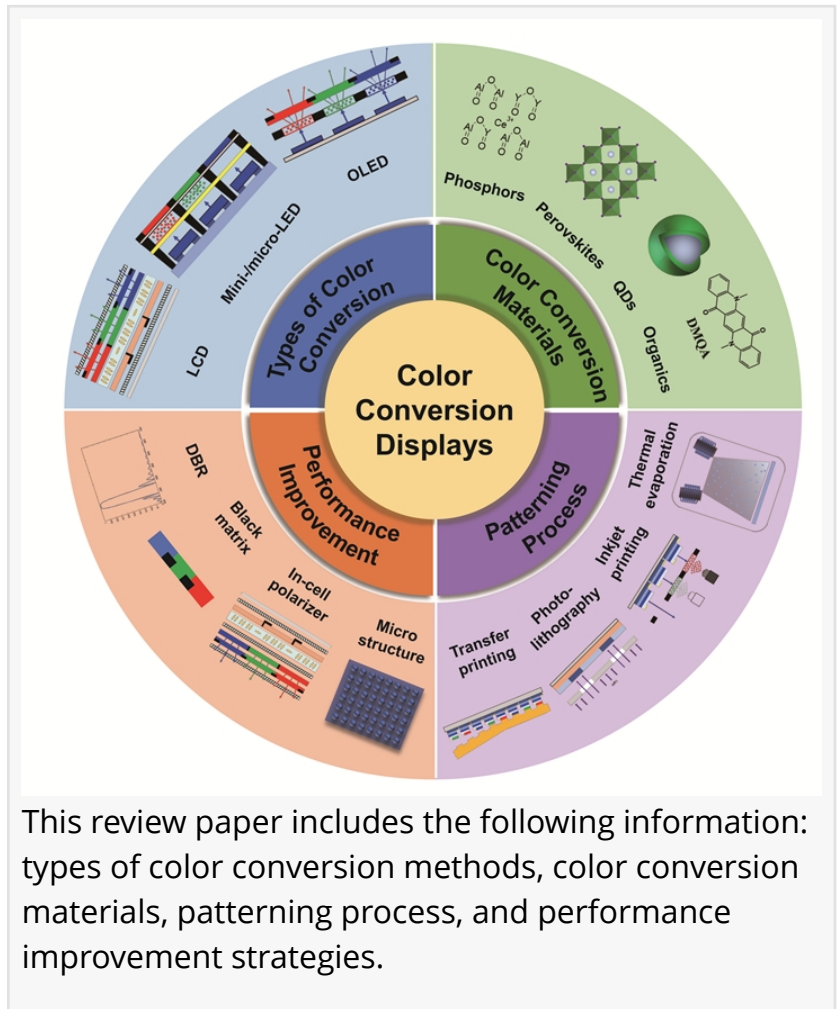


# Color-conversion displays: current status and future outlook

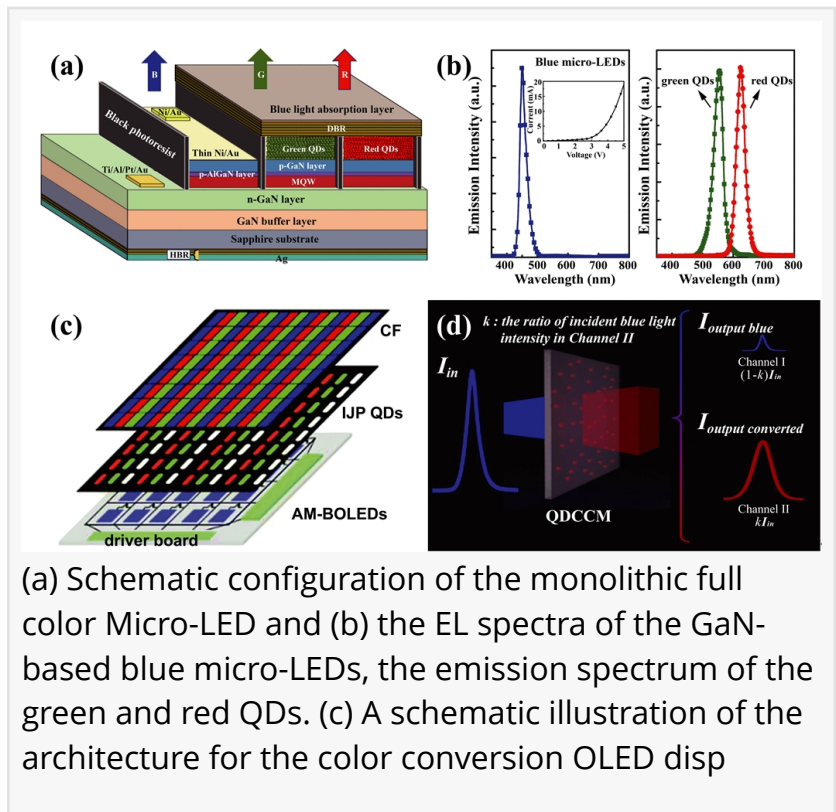
GA, UNITED STATES, November 7, 2024 /EINPresswire.com/ -- The growing focus on enhancing color quality in LCDs, OLEDs and Micro-LED has spurred significant advancements in color-conversion displays. This article provides a comprehensive review of different types of [color conversion](#) methods and color conversion materials. We summarize the current status of patterning process, discuss key strategies to enhance display performance, and speculate on the future prospects and roles that color conversion will play in ultra-high-definition micro- and projection displays.

Display technology has become prominent and ubiquitous in our daily life, with widespread applications in augmented reality (AR)/virtual reality (VR) devices, smartphones, tablets, monitors, TVs, etc. In displays, the increasing demand for high-quality color representation is closely tied to the rising visual expectations of users. Color presentation in displays is generally reproduced by mixing red, green, and blue color primaries through two ways: RGB tri-color independent luminescence, and the utilization of a blue excitation light source combined with a color conversion process. The later one, which is also named as color conversion, offers an alternative approach to color reproduction by utilizing high-energy blue light to generate red and green light, enabling full-color representation.

In a review paper (doi:<https://doi.org/10.1038/s41377-024-01618-8>) published in Light Science & Applications, a team of scientists, led by Professor Hoi-sing Kwok from State Key Laboratory of



Advanced Displays and Optoelectronics Technologies, the Hong Kong University of Science and Technology, Professor Enguo Chen from National and Local United Engineering Laboratory of Flat Panel Display Technology, Fuzhou University, and Professor Guijun LI from Key Laboratory of Optoelectronic Devices and Systems of Ministry of Education and Guangdong Province, Shenzhen University, and co-workers have provided a comprehensive review of color-conversion displays, covering types of color conversion in displays, color conversion materials (CCMs), patterning processes.



(a) Schematic configuration of the monolithic full color Micro-LED and (b) the EL spectra of the GaN-based blue micro-LEDs, the emission spectrum of the green and red QDs. (c) A schematic illustration of the architecture for the color conversion OLED display and (d) the schematic of QDCCM.

“Color-conversion displays have become a significant technology in the display industry market today, they offer advantages such as high brightness, wide color gamut, improved contrast ratio, and simplified fabrication processes. These advancements have reinvigorated various display technologies and are driving the introduction of new LCD, OLED, and Micro-LED display products.” they said.

“Currently, color-conversion LCDs have reached maturity in the market. However, there is still a need for advancements in terms of high resolution, low cost, and high reliability. Extensive research is currently focused on color conversion Micro-LED displays, as this approach is believed to be a feasible pathway for commercializing this emerging display technology.” They added.

“Substantial further research into industry-compatible large-scale patterning, proper packing, and encapsulation is crucial to enable the development of commercial products in this field.” the scientists forecast.

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