

**Impact of Confinement Effects in microLED Display for AR on Color Mixing
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At pixel size below 5 μ m, micro-cavity effects are strongly influencing the angular emission pattern, not only regarding intensity but also spectral changes which influence the color mixing. One way to overcome this, is using Quantum Dots (QD) for color conversion from UV microLED to RGB since all QD work as random dipole emitter resulting in a Lambertian emission profile. However, color down-conversion (D.) is limited to 100-200knits for even the best available QD due to lifetime constraints.

The alternative is to design the LED and optical outcoupling structure with angular distribution pattern in mind while in some cases sacrificing efficiency. That those designs work as intended requires however lateral and vertical structural control in the 20-30nm range and of course extremely high epi-uniformity across the wafer and from wafer to wafer. This is exactly the precision which modern 300mm CMOS fabs are built to handle but is out of range for older 100-150mm LED fabs.