台日合作專題演講

Sub-5-μm GaN micro-LEDs for VR/AR applications fabricated by using neutral beam etching

Google Meeting
(Synchronous)

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Abstract

High efficiency sub-5-μm GaN micro-LEDs with well-defined emission directionality are strongly desired to realize the high resolution and high brightness micro-LED displays for VR/AR applications. Experimental fabrication of the above-mentioned micro-LEDs remains a major technical challenge due to the presence of strong sidewall nonradiative recombination induced by plasma etching and the lack of an effective way of controlling the emission directionality in sub-5-μm LEDs. In this talk, I will first present the realization of 3.5x3.5 μm^2 planar-type GaN blue micro-LEDs with negligible sidewall surface nonradiative recombination, achieved by using the neutral beam etching technique. These micro-LEDs showed record-high peak external quantum efficiency (~38%) and extremely low decrease of EQE with reducing current density. I will next introduce a novel directional micro-LED which is under extensive development in our lab. This novel micro-LED utilizing a coupling effect of evanescent waves in a micron-sized truncated cone structure is expected as the most promising device to realize the high resolution and high brightness micro-LED displays for next-generation VR/AR glasses.

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