

## Light emission properties of GaN/InGaN nanopillars

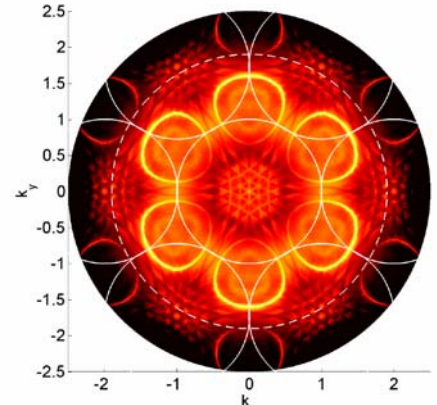
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Recently, surprisingly efficient room-temperature luminescence was observed in GaN/InGaN photonic crystal (PhC) nanopillars whose active region is entirely pierced by the PhC, but still lies on a thick GaN buffer with the same index of refraction.[1] These structures "bridge the gap" between the textbook situations of light emission in a simple multilayer, and in a PhC membrane where strong band gaps and Purcell effect are present.

In this contribution we model the light emission properties of such structures. We show that emission can occur in unexpected quasi-guided Bloch modes, strongly localized in the PhC despite the apparent absence of vertical index confinement. Although unusual, the high quality factor of these modes is well explained by a simple model. We investigate the importance of the Purcell effect in the presence of partial band gaps, and its evolution as the coupling between the active region and the PhC increases. We discuss the potential of such structures as highly efficient light sources.

[1] S. Keller *et. al*, *Journ. Appl. Physics* **100**, 054314 (2006).



Calculated emission diagram of GaN/InGaN nanopillars, as a function of in-plane wavevector