Multicolor micrometer scale light emitting diodes monolithically grown on the same chip

Yifu Guo[1], Yixin Xiao[1], Yakshita Malholtra[1], Yuanpeng Wu[1], Samuel Yang[1], Jiangnan Liu[1], Ayush Pandey[1], and Zetian Mi*,[1]

1) Department of Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, MI 48109, USA

*Corresponding author: ztmi@umich.edu

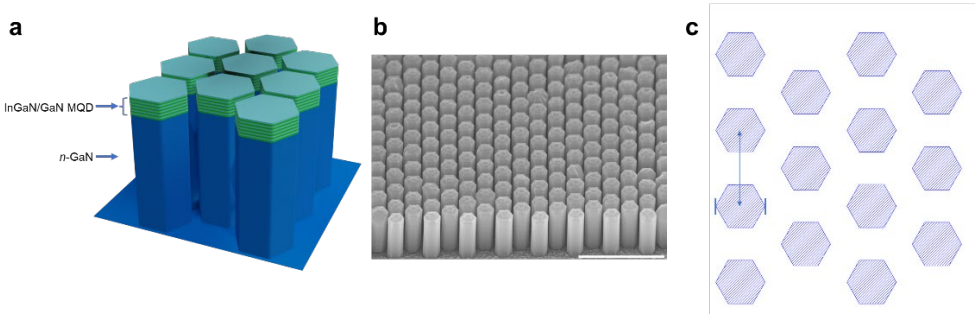

Figure 1. Schematics and structural characterization of a nanowire array. (a) Schematic of the nanowire array with a green InGaN/GaN multiple-quantum-dot (MQD) design for the active region. (b) A sample scanning electron microscopy of such a nanowire array. The scale bar (in white) is 1 micron. (c) Layout of the two-dimensional honeycomb shaped photonic crystal, which is parametrized by nanowire diameter and lattice constant. The two vertical lines indicate the nanowire diameter length, and the vertical double-headed arrow indicates the lattice constant length in this sample crystal design.

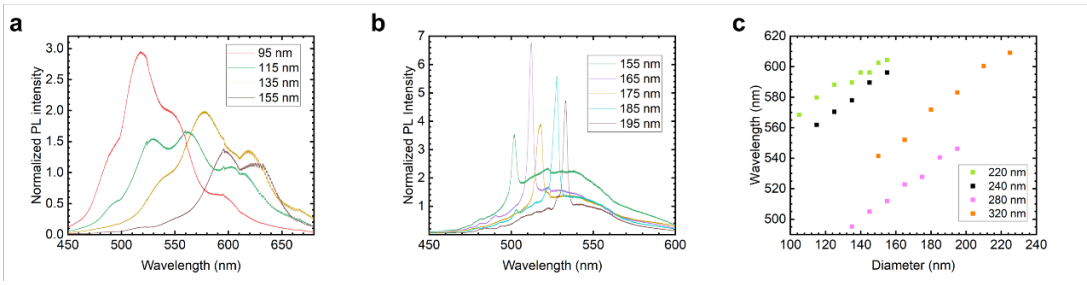

Figure 2. Variation in photoluminescence peak wavelength due to varying nanowire diameter. (a) Photoluminescence spectra for nanowire arrays with a classic multiple-quantum-disk design but different nanowire diameters. The lattice constant is 240 nm

for all curves here. (b) The peak wavelength of photonic crystal mode emissions can be modulated with the nanowire diameter as well. The lattice constant is 280 nm for all curves here. (c) Scatterplot showing the effect of peak wavelength modulation persists for different lattice constants.