Supporting Information

High internal quantum efficiency ultraviolet emission from phase-transition cubic GaN integrated on nanopatterned Si(100)

Richard Liu,[1,2] Richard Schaller,[3] ChangQiang Chen,[4] and Can Bayram*[1,2]

[1]Department of Electrical and Computer Engineering, University of Illinois at Urbana Champaign, Urbana, IL, 61801, USA

[2]Micro and Nanotechnology Technology Laboratory, Urbana, IL, 61801, USA

[3]Center for Nanoscale Materials, Argonne National Laboratory, Argonne, IL, 60439, USA

[4]Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana Champaign, Urbana, IL, 61801, USA

*Address correspondence to: cbayram@illinois.edu

(2 pages, 3 figures)

To compare with the literature, we conducted IQE measurements of conventional samples (purchased commercially) of GaN on Sapphire, free-standing GaN, and GaN/Si wafers. Figures S1-3 show the photoluminescence spectra of 3 µm-thick GaN/sapphire, 325 µm-thick HVPE-grown freestanding GaN, and 500 nm-thick GaN/Si(111) at 1.4 and 300 K, respectively. The IQE values of GaN on Sapphire, free-standing GaN, and GaN/Si wafers. Band-edge emissions are measured to be ~12%, ~8%, and ~2% whereas our novel work with cubic GaN led to an IQE of ~29% - showing the promise of this technology.

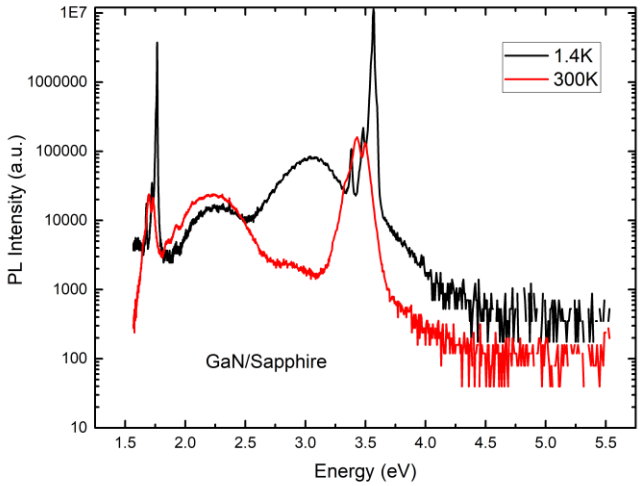

Figure 1 PL spectra of 3µm-thick GaN/Sapphire at 1.4 and 300 K, showing an IQE of ~12%.

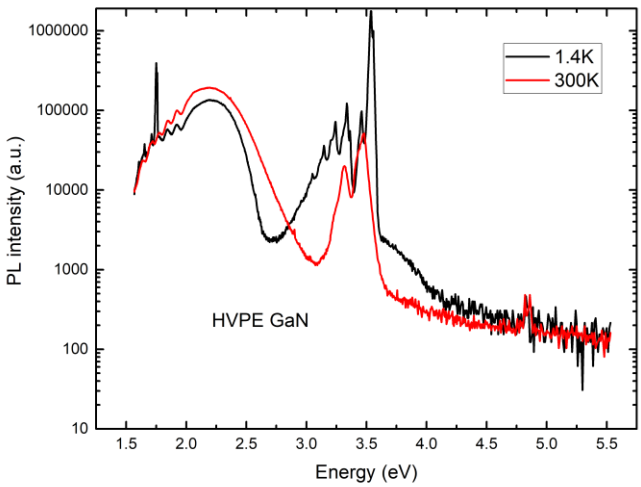

Figure 2 PL Spectra of 325 µm-thick HVPE-grown GaN, showing an IQE of ~8%.

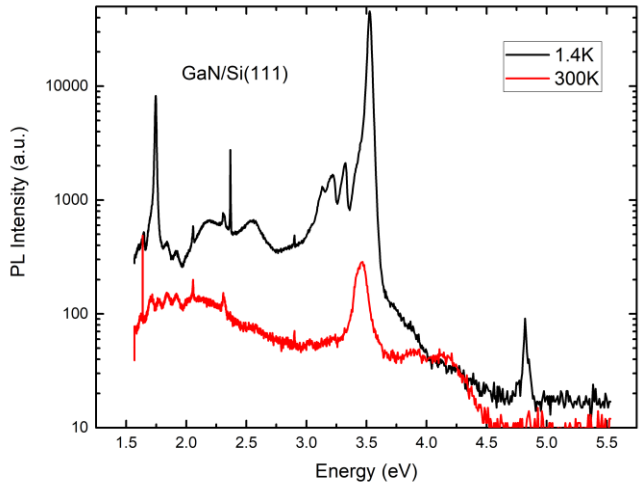

Figure 3 PL spectra of 500 nm-thick GaN/Si, showing an IQE of ~2%.