Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

m-Plane GaN Growth on "Double Miscut" Bulk Substrates for Blue Laser Diode Applications LEAH KURITZKY, DANIEL MYERS, KATHRYN KELCHNER, SHUJI NAKAMURA, STEVE DENBAARS, CLAUDE WEISBUCH, JAMES SPECK, Univ of California - Santa Barbara — Although nearly 100% of today's commercial GaN devices are grown on the c-plane, the non-polar m-plane is an alternative orientation that is free from polarization-induced electric fields, which separate carrier wavefunctions in c-plane InGaN quantum wells (QWs) and reduce radiative recombination rates compared to m-plane. Performance of m-plane blue laser diodes is currently limited by low In uptake and broad linewidth in the blue spectrum compared to c-plane. This work examines the impact of m-plane surface miscut on these performance aspects. The morphology was examined by atomic force microscopy for homoepitaxy on co-loaded substrates: on-axis, -1° $c-$miscut, 1° $a-$miscut. All three films showed regions of diagonal $a+c$ step direction where pure a- or c-direction steps were expected. These $a+c$ regions also emitted longer wavelength in fluorescence and cathodoluminescence than other step directions. "Double miscut" substrates in the combined a- and c-directions take advantage of the observed stable $a+c$ step direction and redshift. Multi-QWs on double miscut substrates exhibited <30 nm linewidth in the blue spectrum and higher In uptake than ever achieved for standard miscut $m-$plane.

Leah Kuritzky
Univ of California - Santa Barbara

Date submitted: 14 Nov 2014 Electronic form version 1.4