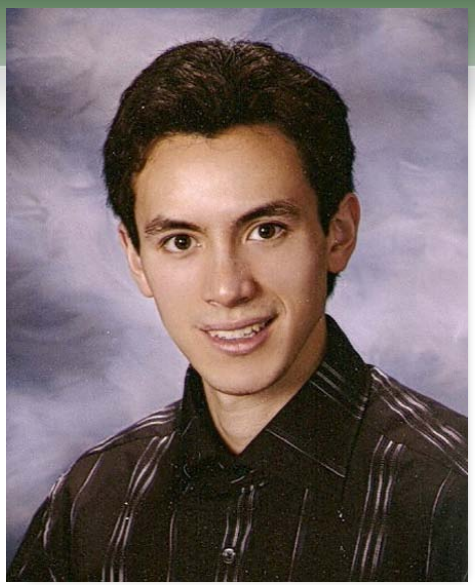
Christopher Yerino



Graduate Institution: Yale University

Location: New Haven, CT

Graduate Discipline: Electrical Engineering

Hometown: Kansas City, MO

Research Interests:

(1) Semiconductor crystal growth: III-nitride semiconductors, metalorganic chemical vapor deposition, heteroepitaxy of lattice mismatched semiconductors, compliant substrates, growth of non-polar and semipolar GaN, generation and propagation of crystalline defects, morphological evolution of a growing crystal, Wulff plots and kinetic-Wulff plots of semiconductors. (2) Nanoporous semiconductors: electrochemical etching to produce nanoporous GaN, etching mechanisms, high temperature processing of nanoporous semiconductors, novel properties and applications of nanoporous semiconductors. (3) Optoelectronic devices: light emitting diodes, laser diodes, solar cells.

About me:

I have spent the first year of my graduate program, in addition to the two years prior, studying the crystal growth of III-nitride semiconductors (e.g. GaN) with Prof. Jung Han. My current and past work spans most of the interests listed above, and is currently represented in over ten coauthored publications. Presently, I am studying the kinetic Wulff plots of GaN, which represent growth rates of the crystal facets as a function of their orientation (i.e. angle or Miller index). These plots vary greatly by growth condition, and can be used as a tool to control the shape and coalescence of 3D islands when GaN is grown on a foreign substrate. Through such plots we have been able to understand and control the morphological evolution as well as the propagation of defects in nonpolar and semipolar GaN, enabling the development of efficient semipolar light emitting diodes. My second research direction is the use of nanoporous GaN as a template for III-nitride growth. The nanoporous medium can potentially improve optopelectronic devices in a number of ways including light extraction, dislocation filtering, and strain relief. We have already achieved preliminary demonstrations of such benefits. I am also studying the morphological restructuring of nanoporous GaN under thermal annealing to manipulate the porosity and thus its material properties.

Post-graduation, I plan to continue research in either an academic or industrial setting. I am interested in developing novel materials for electronics, and I wish to continue work in high performance LED's and solar cells to support our energy economy.