Selective Area Epitaxy of Core-Shell Gallium Nitride Nanowire LEDs

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Abstract:

Gallium nitride nanowire light-emitting diodes are currently being developed for a broad range of emerging applications, including nanoscale light sources for advanced probes and sensors. Practical implementations require control over both nanowire diameter and location, which can be obtained through selective-area growth processes. In this talk, I will discuss the importance of crystallographic polarity in GaN nanowire synthesis, specifically describing techniques for characterizing and controlling the growth polarity on silicon substrates. Ordered arrays of GaN nanowires grown by selective area epitaxy were also utilized for measuring various physical parameters and their geometric dependencies, including surface recombination velocity and strain in core/shell structures. I will also discuss our work in developing nanowire LEDs by N-polar selective area epitaxy, including AlGaN/GaN core-shell heterostructures for enhancing carrier confinement and InGaN quantum wells for wavelength tuning in nanowire LED structures.

Biography:

Matt Brubaker is a research scientist at the National Institute of Standards and Technology in Boulder, Colorado, where his work is focuses on semiconductor nanostructures. He has expertise in epitaxial growth and related nano-characterization techniques with research interests in gallium nitride nanowires for device and sensor applications. He has authored over 45 papers, including a book chapter, and holds five patents. Dr. Brubaker holds a Ph.D. in Mechanical Engineering from the University of Colorado and M.S. and B.S. degrees in Engineering Science from Penn State University.