

**DEVELOPMENT AND CHARACTERIZATION OF INDIUM GALLIUM NITRIDE
HETEROSTRUCTURES FOR USE AS LIGHT EMITTERS AND LASER DIODES**

By

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ABSTRACT:

Optical and electrical methods are used to characterize GaN-based heterostructures characterized by a multiple quantum well active region with the ultimate goal of producing superior light and laser emitting structures. Heterostructures are analyzed for peak emission intensity, line width, lasing threshold, and absorption and gain coefficients by using techniques such as photoluminescence measurements and the variable stripe length method. The effects of optical confinement and cavity properties on stimulated emission in these heterostructures are probed for better understanding and to overcome some of the challenges involved in creating laser diodes in the green spectral range. Heterostructures have shown stimulated emission with peak wavelengths as long as 504 nm and with thresholds as low as 489 kW/cm². By confining the excitation, a dependence of lasing threshold on stripe width has been observed.