

MBE-Grown III-Nitride Based Blue Laser Diodes on c-plane n-doped GaN Substrates

Presenter: Syed Mohammad Najib Hasan

Co-Author(s): Hyemin Jung, Sadaf Sharif, Haipeng Tang and Shamsul Arafin

Advisor(s): Shamsul Arafin

Department: ECE

In this work, we focus on design, fabrication and testing of III-nitride based edge-emitting diode lasers with an emission wavelength around 450 nm. In order to obtain lasing operation, efforts will be primarily made on the optimization of the active region to achieve good material gain.

In this work, we focus on design, fabrication and testing of III-nitride based edge-emitting diode lasers with an emission wavelength around 450 nm. The materials growth was performed by hydrogen-free plasma-assisted molecular beam epitaxy. The laser structures are grown on c-plane free-standing n-doped GaN substrates. The major goal of this research is to achieve electrically-pumped and continuous-wave operating blue lasers with reasonable threshold current and optical power. Despite of the reasonable turn-on and series resistance, hinting good p-doping at the top cladding layer and low-resistive ohmic contact at the p-side, devices exhibit only strong electroluminescence even at a current density of 20 kA/cm². The reason of this non-lasing behavior could be due to unoptimized active region made of three quantum wells. In order to obtain lasing operation, efforts will be primarily made on the optimization of the active region to achieve good material gain.