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Monolithically integrated tunable (QW) laser

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A monolithically integrated broadly tunable MQW laser that utilizes a combined impurity-free vacancy disordering (IFVD) of quantum wells and optical beam steering techniques is proposed, fabricated and investigated experimentally. The device consists of a beam-steering section and an optical amplifier section fabricated on a GaAs/AlGaAs quantum well (QW) *p-i-n* heterostructure. The beam steering section forms a reconfigurable optical waveguide that can be moved laterally by applying separately controlled electrical currents to two parallel contact stripes. The active core of the gain section is divided in into selectively intermixed regions. The selective intermixing of the QW in the gain section results in neighboring regions with different optical bandgaps. The wavelength tuning is accomplished by steering the amplified optical beam through the selected region where it experiences a peak in the gain spectrum determined by the degree of intermixing of the QW. The laser wavelength tunes to the peak in the gain spectrum of that region. The IFVD technique relies on silica (SiO_2) capped rapid thermal annealing and it has been found that the degree of intermixing of the QW with the barrier material is dependent on the thickness of the SiO_2 film. Optical characterizations of the intermixed regions have shown a blue shift of peak of the electroluminescence emission of 5 nm, 16 nm and 33 nm for the uncapped, 100 nm and 200 nm respectively when compared to the as grown sample. The integrated laser exhibited a wavelength tuning range of 17 nm (799 nm to 816 nm).

Biography

Abdullah J Zakariya has completed his PhD from University of Central Florida. He worked as a Wireless Communications Engineer for 15 years and currently holds the position of the Wireless Networks Director at the Ministry of Interior – Kuwait where he takes up a variety of projects involving wireless public safety networks, telecommunications jammers and MPLS optical fiber networks. He also has several publications in the optics field specifically in tunable lasers and LEDs; moreover, he has several publications in the biomedical optics field focusing on point of care testing and lab-on-a-chip devices.

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