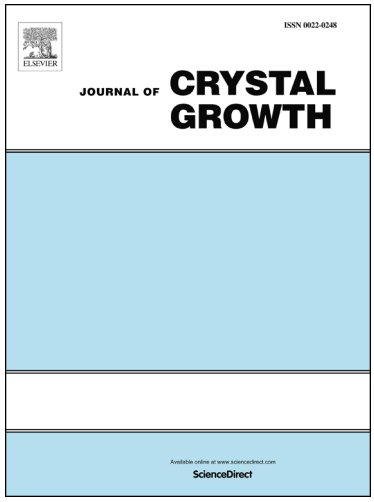

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Metamorphic InAs quantum well lasers on InP substrates with different well shapes and waveguides

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Abstract

The effects of well shapes and waveguide materials on InP-based InAs quantum well lasers have been investigated. The laser structures were grown on metamorphic $In_{0.65}Al_{0.35}As$ buffers. A novel trapezoidal quantum well composed of $In_yGa_{1-y}As$ grading and InAs layer was used to improve the quality of quantum well. Quaternary $In_{0.65}Al_{0.2}Ga_{0.15}As$ waveguide was applied instead of ternary $In_{0.65}Ga_{0.35}As$ to enhance the carrier injection. The material qualities have been characterized by X-ray diffraction, transmission electron microscopy and photoluminescence measurements, while the device properties of the lasers with various structures were investigated at different temperatures. Results show that the laser performances have been improved by the use of trapezoidal quantum wells and InAlGaAs waveguides.

Key words: B3. Laser diodes; B2. Semiconducting III-V materials; A3. Molecular beam epitaxy; B1. Arsenates