Electrical and thermal study of ridge waveguide widely tunable semiconductor diode lasers.

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Abstract:

Widely tunable semiconductor diode lasers in a ridge configuration suffer from internal heating owing to energy loss. A commercial FEM solver, FlexPDE, was used to study ridge waveguide semiconductor diode lasers. Electrical and thermal 2D solutions were obtained[1,2]. The solutions showed a lack of confinement of carriers to the active area. The poor injection efficiency was attributed to the ridge nature and the design of the quantum wells of the diode lasers[3,4]. The carriers leak away from the active area and increase the heat energy inside the device. Using the model, solutions to improve the electrical confinement were studied. Isolation etching and ion implantation[5,6] showed potential for improving the electrical injection to the active area and in return reducing the device temperature. We present initial experimental results of the isolation etch on the performance of widely tunable semiconductor ridge waveguide lasers.

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