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Physical analysis of an operation of GaInAs/GaAs quantum-well vertical-cavity surface-emitting diode lasers emitting in the 1.3-μm wavelength range

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Keywords

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Abstract

Comprehensive three-dimensional self-consistent optical-electrical-thermal-gain physical modelling is used to simulate room-temperature continuous-wave performance characteristics of GaInAs/GaAs lasers emitting in the 1.3-μm wavelength range. The simulation takes into consideration all physical phenomena crucial for a laser operation including all important interactions between them. A real possibility to design high-performance 1.26-μm GaInAs/GaAs quantum-well vertical-cavity surface-emitting diode lasers (VCSELs) with the aid of a currently available technology is shown. Their outputs are much higher than in the case of their quantum-dot version. Methods to shift the emitting wavelength range of 1.3 μm are discussed and anticipated performance characteristics of such a 1.3-μm VCSELs are determined.

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