Abstracts

Multilayer analysis of anisotropic heat flux in vertical cavity-surface emitting lasers with quarter-wave semiconducting mirrors

A.A. Leal, M. Osinski and E. Conforti. "Multilayer analysis of anisotropic heat flux in vertical cavity-surface emitting lasers with quarter-wave semiconducting mirrors." 1998 Transactions on Microwave Theory and Techniques 46.3 (Mar. 1998 [T-MTT]): 208-214.

Monolithic arrays of vertical cavity-surface emitting lasers (VCSELs) have the potential to be used in microwave systems based on opto-electronic technologies. However, the temperature has a strong influence over several characteristics of VCSELs. Self-heating may restrain the gain inside the device cavity and it is responsible for an increase in the laser threshold current as well as a decrease of its output power. In this paper, the thermal behavior of VCSELs was evaluated by means of a procedure that takes into account the multilayer aspects of the heat-flux propagation. The method has the advantage of dealing with the heat propagation inside each layer of the periodic structures of the device. Thus, the different characteristics and influence of the materials employed in the chip manufacturing can he considered and the device temperature profile can be predicted. From the method assumptions and simulations, the thermal resistances of typical devices were calculated. The results were shown to be in good agreement with experimental values reported in the literature.

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