Modeling of edge-emitting lasers based on tensile strained Germanium microstripes

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This contribution is devoted to the thorough modeling of an edge-emitting laser based on strained germanium microstripes carried out in [1]. For a tensile strained Ge layer with a biaxial strain decreasing linearly from top to bottom of the layer according to [2], the full band structure enters the calculations to determine the optical properties [3]. In the spirit of [4], the material gain then serves as an input for fully-coupled simulations of the carrier transport and the optical field. The simulations are performed using the WIAS-TeSCA semiconductor simulation tool [5] within a two-dimensional cross section of the microstripes orthogonal to the optical cavity. In this way, two different device designs are studied and compared with regard to their laser threshold and performance. The results are very promising as they even predict lower threshold currents and higher efficiency of Ge emitter devices published insofar.

Acknowledgments: The work of Th. Koprucki was supported by the Deutsche Forschungsgemeinschaft (DFG) within the collaborative research center 787 "Semiconductor Nanophotonics". Within the Einstein Center for Mathematics Berlin D. Peschka and M. Thomas are supported by the MATHEON-Project D-OT1 "Mathematical Modeling, Analysis, and Optimization of Strained Germanium-microbridges" and A. Glitzky by MATHEON-Project D-SE2 "Electrothermal modeling of large-area OLEDs". Moreover, the authors are grateful to H. Gajewski, U. Bandelow and H.-J. Wünsche for many fruitful discussions and helpful remarks.

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