

Nanostructures for intracavity spatial filtering in microlasers

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Microlasers (edge emitting lasers, microchip lasers) usually suffer from the poor spatial quality of emitted radiation, especially in high power regimes. Conventional techniques of intracavity spatial filtering are not applicable in such small-size devices. We propose the specially designed photonic microstructures (photonic crystals, micro-modulated thin films), to provide the intracavity spatial filtering, which due to their small dimensions (several micrometers of thickness) are especially useful in microlasers [1].

Especially challenging is the microfabrication of such structures - in inorganic material, of 3D modulation with a submicron modulation period. Up to now we used the direct laser writing [2], or atomic vapor deposition [3] to fabricate such filtering microstructures. However, the fabrication alternatives are highly desirable.

In the presentation I will show my online simulators of microchip lasers, and visually demonstrate how the simulated intracavity photonic microstructures improve the beam spatial quality. I will show the current experimental results as well. Presently the intracavity spatial filtering allows to improve the brightness of laser radiation by the factor of 3.

The search for the new contacts for fabrication alternatives and other technological issues, leading to new collaborations, is the main reason to participate in your conference.

References

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- [3] L. Grineviciute, e.a., Adv. Optical Mater., 2001730 (2021)