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High brightness photonic crystal semiconductor lasers

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High power diode lasers are the key elements in a wide range of applications such as pumping for solid-state lasers and fiber lasers, data transfer and material processing and the devices with high emission power and low far-field divergence are desired for many applications. Bragg reflection waveguide lasers and longitudinal photonic bandgap crystal (LPBC) lasers have been proposed to realize the high brightness diode lasers based on the PBC mechanism. In these devices, light is confined by the photonic band-gap effect in vertical direction rather than by total interface reflection (TIR) and low vertical divergence and circular beams have been demonstrated in single devices. In this paper, we introduce our recent work on the high brightness diode lasers based on the PBC waveguide with lateral microstructure. The one dimensional PBC structure demonstrated the low divergence ($<5^0$) in fast-axis, the lateral microstructure showed the evident improvement of beam quality in slow-axis. The high efficiency of directly coupled into fiber was achieved. The high-power PBC lasers were used for external-cavity spectral beam combining (SBC) and the high brightness was demonstrated.

Biography

Cunzhu Tong is working as a Professor at the Changchun Institute of Optics, Fine Mechanics and Physics (CIOMP), Chinese Academy of Sciences (CAS). He received his PhD degree from CAS in 2005 and became the Professor of Hundred Talent Programs of CAS in 2010. He was the Distinguished Elite Professor of CAS and the Standing Committee Member of Chinese Society Astronautics. He has won several awards including the Outstanding Young Scientist Award of Scientific Chinese, the Excellent Award for Hundred Talents Program and the Important Achievements in China Optics in 2015. He has authored and co-authored over 80 refereed journal papers.

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