



High power, high brightness pumps for kW Fiber lasers

Hemashilpa Kalagara

Lumentum Operations LLC, USA

Abstract:

High power fiber lasers are used in laser material processing such as laser welding, cutting, drilling etc. for wide range of applications. Diode lasers are very cost effective and efficient pump sources for fiber lasers. They consist of arrays of diode lasers which generate hundreds of watts of power, that is are coupled into the fibers using alignment optics, all of which are assembled in a compact package. GaAs based broad area lasers at 980nm are used as the pumps. The key requirements for laser material processing applications are high power and low Beam parameter product (BPP). A typical broad area laser (BAL) has length of at least 5mm and width of 100um, generating 14W power at 15A and BPP of 3.77. Due to the large stripe width, the laser is multimode and the FF profile has numerous peaks. In our current study, we designed, processed and tested an array of narrow stripe lasers with varying gaps, whose total output aperture is equal to width of BAL, to obtain lower BPP, while still maintaining the power. The narrow stripe lasers are 4um wide at the rear facet and the width is adiabatically increased up to 20um at the front facet to maintain single mode operation and a Gaussian FF profile. The narrow stripe laser array of same dimensions as BAL generates 11W power at 15A and BPP of 3.0. We are able to match the power of our BAL to narrow stripe laser array with more number of emitters. Due to the Gaussian FF profile, the power in NA and coupling efficiency into the fiber is expected to be better than the BAL. Another advantage of the narrow stripe laser array is the device is functional even after one or more lasers in the array die or have low power.

Biography

Hemashilpa Kalagara received her BE in Electronics and Instrumentation Engineering from the Birla Institute of Technology and Science-Goa, India, in 2008. She obtained her PhD in Electrical Engineering from the University of New Mexico in 2015. Currently, she is as a Laser Diode Chip Designer, doing research and development of highly innovative high power edge emitting (EE) lasers for industrial applications and vertical cavity surface emitting lasers (VCSELS) for 3D sensing applications.

Publication of speakers

1. Reciprocity principle and nonequivalence of counterpropagating modes in whistle-geometry ring lasers, H Kalagara, FH Chu, GA Smolyakov, M Osiński, Physics and Simulation of Optoelectronic Devices
2. Rate Equation Analysis of Q-Modulated Strongly Injection-Locked Whistle-Geometry Ring Lasers
3. H Kalagara, GA Smolyakov, M Osiński, IEEE Journal of Selected Topics in Quantum Electronics 21 (6), 619-627
4. Induced anomalous dispersion in semiconductor lasers, H Kalagara, PG Eliseev, M Osiński, IEEE Journal of Selected Topics in Quantum Electronics 19 (4), 1502508-1502508

Citation: Hemashilpa Kalagara, High power, high brightness pumps for kW Fiber lasers, May 20-21, 2021, Osaka, Japan