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High power widely tunable optically pumped semiconductor lasers

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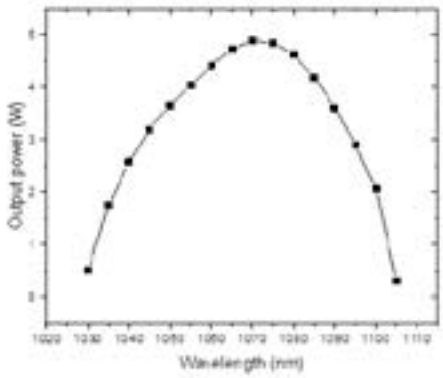
The bandwidth of an optically pumped semiconductor laser (OPS) is determined by the bandwidth of the material gain, the bandwidth of the longitudinal confinement factor (LCF) and the bandwidth of the Distributed Bragg Reflector (DBR). For a typical OPS-structure at 1064nm, the bandwidth of the DBR is the largest among them. In this work, we demonstrate a tunable OPS-structure with broadened material gain and LCF, so that the bandwidth of the OPS is close to the bandwidth of the DBR. The laser outputs more than 2W, tunable in a wavelength range of 1035–1100nm. High power and high bandwidth are difficult to achieve simultaneously in an OPS. For high power, one would prefer a high out-coupling (OC) for a high slope efficiency. For high bandwidth, a low OC is necessary to extend the usable gain as far away from the center as possible. Nearly all widely tunable OPS result is demonstrated with an HR cavity (low OC), where the output power is only a fraction of the pump power. In this work, the OPS-structure is engineered in such a way that the modal gain (the product of the material gain and longitudinal confinement factor) is as flat as possible in the usable band of the DBR so that there is still substantial gain at the edges of the tuning range. This is the key feature to achieve simultaneously high power and broad tuning range.



Biography

Yanbo Bai has completed his PhD from Northwestern University. His research at Northwestern led to the most efficient and most powerful quantum cascade lasers. His current role at Coherent is to develop more efficient optically pumped semiconductor lasers and explore new wavelength capabilities. He has published more than 40 papers in reputed journals, such as Nature Photonics, Applied Physics Letters, Journal of Applied Physics, etc.

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