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Characterization of optically pumped semiconductor lasers in pulsed mode

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Self-heating of optically pumped semiconductor (OPS) chip has been identified as the major limiting factor of power scaling in OPS-based lasers in continuous wave (cw) mode. In this work, characterization of OPS lasers in short pulse (100 ns) and low duty cycle (1%) regime, where self-heating is negligible, as a function of the heat sink temperature is presented. This data, combined with a rigorous thermal model, allows us to predict OPS chip performance in new cooling configurations for power scaling. Furthermore, the temperature dependent pulsed mode measurement data can be used to calibrate a temperature dependent gain model based on the 8-band kp method, taking the Auger coefficient as the fitting parameter, thus allowing for predicting the performance of new structures. The pulsed-mode testing proved to be a valuable technique to reveal the OPS chip quality independent of the thermal management and to validate the OPS gain model.

Biography

Yanbo Bai has completed his PhD from Northwestern University. His research led to develop 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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