NT-P05

Performance of InAs/GaAs quantum dot lasers to high-power application

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Quantum dots (QDs)-based semiconductor lasers are promising device due to their potential optoelectronic properties such as lower threshold currents, a larger differential gain and temperature insensitivity. Measurement of the linewidth enhancement factor (α-factor) of these QD lasers is very important because it determines the linewidth, the frequency chirping under high bit rate modulation and the toleranceto optical feedback.

In this paper, performance of InAs/GaAs quantum dot (QD) single-mode laser diodes (LDs) emitting at 1.3 μm has been characterized. For QD ridge LDs with a 5-μm-wide stripe and a 1-mm-long cavity, the emission wavelength of 1284.1 nm, the single-uncoated-facet CW output power as high as 90 mW, the external efficiency of 0.31 W/A and the threshold current density of 800 mA/cm2 are obtained. α-factor is successfully measured by investigating the ratio between the carrier density induced change of the refractive index and gain. We will discuss effects of α -factor on the filamentation by using QD structures instead of conventional quantum well and details on the device performance of InAs/GaAs QD LDs.