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

K. C. Kim\textsuperscript{1, 2}, Y. C. Yoo\textsuperscript{1}, I. K. Han\textsuperscript{1}, J. I. Lee\textsuperscript{1} and T. G. Kim\textsuperscript{2}

\textsuperscript{1}Korea Institute of Science and Technology
\textsuperscript{2}School of Electrical Engineering, Korea University

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 tolerance to 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/cm\textsuperscript{2} 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.