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Terahertz frequency quantum cascade lasers with >1 Watt output power

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1. Introduction

High power terahertz (THz) frequency quantum cascade lasers (QCLs) have a broad range of potential applications, including spectroscopy, imaging and remote sensing [1-2]. We demonstrate THz QCLs with >1 W peak output power from a single facet at 10 K using broad area laser ridges [3]. The active region is based on a GaAs–AlGaAs bound-to-continuum quantum cascade structure incorporating a single-quantum-well phonon extraction/injection stage, similar to that reported in Ref. 4. The whole QCL structure was grown by solid-source molecular beam epitaxy on a semi-insulating GaAs substrate.

2. Results

Figures 1(a) and (b) show the performance of a high power THz QCL, operating at 3.4 THz.. The device emits 1.01 W peak output power at 10 K when driven at a 2% duty cycle (2 μ s pulses, at a repetition rate of 10kHz). The QCL operated up to a maximum temperature of 120 K.

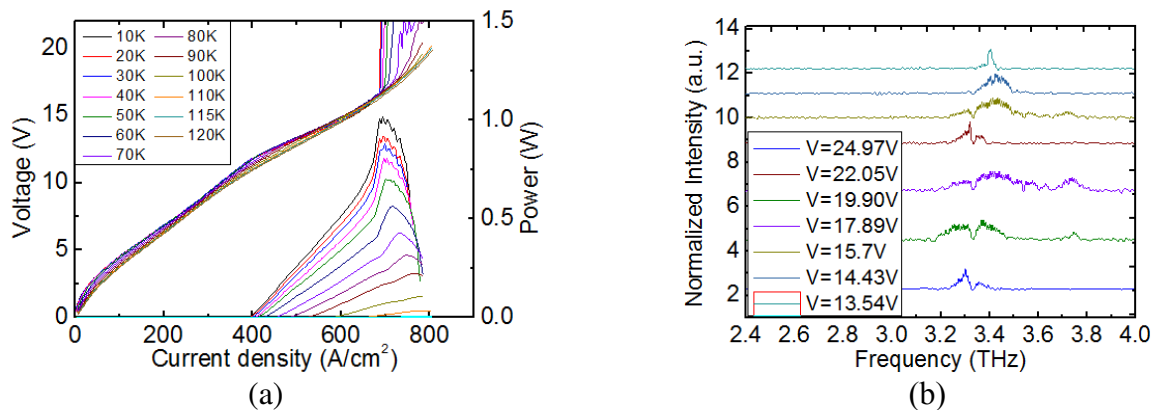


Fig. 1 (a) L–I–V curves, and (b) spectra, obtained with a 2% pulse duty cycle, of a high power THz QCL with a bound-to-continuum THz QCL active region incorporating a single-quantum-well phonon extraction/injection stage.

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Reference

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