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Title:Terahertz dual-wavelength quantum cascade laser based on GaN active region

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Abstract:In this paper a novel terahertz (THz) quantum cascade laser (QCL) based on GaN/AlGaIn quantum wells has been proposed, which emits at two widely separated wavelengths 33 and 52 μm simultaneously in a single active region. The large LO-phonon energy ($\sim 90\text{meV}$), the ultrafast resonant phonon depopulation of the lower radiative levels, suppression of the electrons that escape to the continuum states and selective carrier injection and extraction all together lead to a considerable enhancement in the operating temperature of the structure. All calculations have been done at a temperature of 265K. Moreover, similar behavior of the output optical powers is another remarkable feature, which makes both wavelengths useful for special applications. [All rights reserved Elsevier].

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Inspec controlled terms:aluminium compounds - gallium compounds - III-V semiconductors - millimetre wave lasers - phonons - quantum cascade lasers - semiconductor quantum wells - wide band gap semiconductors

Uncontrolled terms:terahertz dual-wavelength quantum cascade laser - quantum wells - LO-phonon energy - ultrafast resonant phonon depopulation - electrons suppression - continuum states - selective carrier injection - wavelength 33 μm - wavelength 52 μm - electron volt energy 90 meV - temperature 265 K - GaN-AlGaIn

Inspec classification codes:A4255P Lasing action in semiconductors - A4260B Design of specific laser systems - B4320J Semiconductor lasers

Numerical data indexing:wavelength 3.3E-05 m;wavelength 5.2E-05 m;electron volt energy 9.0E-02 eV;temperature 2.65E+02 K

Chemical indexing:GaNAIGaN/ss Al/ss Ga/ss N/ss

Treatment:Practical (PRA)

Discipline:Physics (A); Electrical/Electronic engineering (B)

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