



Terahertz Quantum Cascade Lasers

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The Invention

A terahertz quantum cascade laser device is provided comprising a substrate having a top substrate surface, a bottom substrate surface, and an exit facet extending between the top substrate surface and the bottom substrate surface at an angle θ_{ap} . The device comprises a waveguide structure having a top surface, a bottom surface, a front facet extending between the top surface and the bottom surface and positioned proximate to the exit facet, and a back facet extending between the top surface and the bottom surface and oppositely facing the front facet. The waveguide structure comprises a quantum cascade laser structure configured to generate light comprising light of a first frequency ω_1 , light of a second frequency ω_2 , and light of a third frequency ω_{THz} , wherein $\omega_{\text{THz}} = \omega_1 - \omega_2$; an upper cladding layer; and a lower cladding layer. The device comprises a distributed feedback grating layer configured to provide optical feedback for one or both of the light of the first frequency ω_1 and the light of the second frequency ω_2 and to produce lasing at one or both of the first frequency ω_1 and the second frequency ω_2 , thereby resulting in laser emission at the third frequency ω_{THz} at a Cherenkov angle θ_{THz} through the bottom surface of the waveguide structure into the substrate and exiting the substrate through the exit facet. The device comprises a high-reflectivity coating on the front facet of the waveguide structure.

Additional Information

For More Information About the Inventors

- [Dan Botez](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Lasers](#)

For current licensing status, please contact Michael Carey at mccarey@warf.org or 608-960-9867