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Accession number:20123615392663 Title:New designs expand capabilities of quantum-cascade lasers Authors:Hecht, Jeff (0) Corresponding author:Hecht, J. Source title:Laser Focus World Abbreviated source title:Laser Focus World Volume:48 Issue:8 Issue date:August 2012 Publication year:2012 Pages:53-56 Language:English ISSN:10438092 CODEN:LFWOE8

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Publisher:PennWell Publishing Co., 1421 South Sheridan Road, Tulsa, OK 74112, United States Abstract:Performance of quantum-cascade lasers (QCLs) have become vital tools for infrared applications ranging from sensors and delicate measurement devices to military countermeasures. Their properties depend largely on their structure rather than on the semiconductor compound, with operating ranges from the mid-IR to the terahertz band, roughly spanning 3 to 300μm. Designers can incorporate structures used in other semiconductor lasers, such as buried heterostructures and distributed feedback. In 2009, a DARPA-funded team reported a then-record CW room temperature output of 3 W at 4.6 μm. Their novel design allowed simultaneous optimization of several design parameters, reducing threshold current density to 0.86 kA/cm² and increasing wall-plug efficiency to 12.7%. Commercial QCLs can generate diffraction-limited power to 2W at 4 to 5μm in the mid-IR atmospheric window. Interband cascade lasers are hybrids of QCLs and conventional diodes, in which electrons cascade through a series of quantum wells.

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