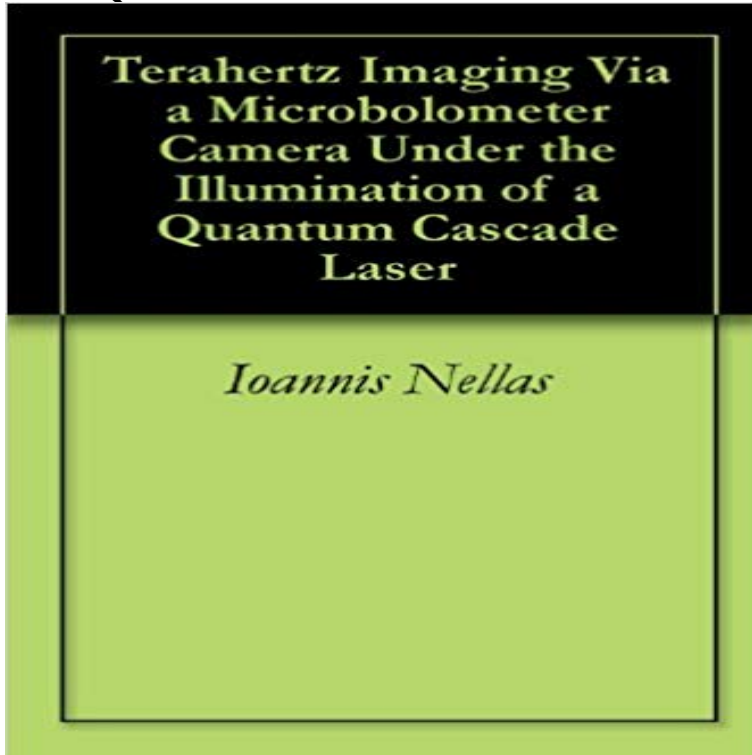


Terahertz Imaging Via a Microbolometer Camera Under the Illumination of a Quantum Cascade Laser



The terahertz (THz) region of the electromagnetic spectrum has not been fully utilized due to the lack of compact and efficient sources as well as detectors. This thesis aimed on characterizing a quantum cascade laser (QCL) beam and achieving high quality real-time THz imaging using a 160x120 pixel FLIR A20M microbolometer camera designed to operate in long wave infrared range. The FTIR spectroscopy of the QCL beam revealed that lasing could be achieved at 2.85 and 2.91 THz frequencies depending on the bias current. This behavior was analyzed using the longitudinal modes of the laser and found to correspond well with the experimental observations. Real-time imaging of concealed objects in transmission mode was accomplished using the silicon nitride-based microbolometer camera under illumination via the QCL with average power less than 1 mW. The larger extent of the object required the expansion of the narrow laser beam using a parabolic reflector and refocus on the camera using a second parabolic reflector. The standard Ge lens of the camera was replaced by a Tsurupica lens since the earlier lens was opaque to THz radiation. The real-time imaging can be extended to reflection mode as well as longer standoff distances using higher power THz lasers.

[\[PDF\] Surface-Active Processes in Materials \(Ceramic Transactions, Vol. 101\)](#)

[\[PDF\] PRACTICAL ARRAY PROCESSING](#)

[\[PDF\] Werkstoffwissenschaften und Fertigungstechnik: Eigenschaften, Vorgänge, Technologien \(Springer-Lehrbuch\) \(German Edition\)](#)

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[\[PDF\] Universelles Zellenrechnerkonzept für flexible Fertigungssysteme \(iwv Forschungsberichte\) \(German Edition\)](#)

[\[PDF\] Environmental Impact of Nuclear Power Plants: Proceedings of a Conference Held November 26-30, 1974, Sponsored by the School of Nuclear Engineering, Georgia ... USA \(Progress in nuclear energy series\)](#)

Real-time imaging using a 2.8 THz quantum cascade laser - Core Palm size Terahertz Camera and Compact Quantum Cascade Laser The THz camera contains 320x240 microbolometer focal plane array which THz images taken with the THz microscope are finally presented. QCL is collected and focused with illumination optics, which is

composed of seven high-resistivity Si

Terahertz Imaging Via a Microbolometer Camera Under Illumination

FUNDING NUMBERS Terahertz Imaging Via a Microbolometer Camera Under the Illumination of a Quantum Cascade Laser 6. AUTHOR(S) Ioannis Nellas 7. **Proposal for real-time terahertz imaging system with - DSpace@MIT** 2.7-THz QCL radiation and imaged with microbolometer camera. (c) . Colorized frame capture of IR-160 camera under illumination by 2.8 THz OPO beam (with **Use of 2.7-THz Quantum Cascade Laser and Microbolometer** Keywords: imaging, quantum cascade lasers, terahertz. (Some figures may .. filtered beam was then focused through the sample under taken from different illumination angles using a rotation stage commonly requires the use of microbolometer or pyroelectric microbolometer camera Opt. Lett. **Imaging of 3.4 THz Quantum Cascade Laser Beam Using an** THz imaging using a 160x120 pixel FLIR A20M microbolometer camera microbolometer camera under illumination via the QCL with average power less than **Terahertz Imaging Via a Microbolometer Camera Under the** Terahertz imaging via a microbolometer camera under illumination of a quantum cascade laser. r, Karunasiri, Gamani. **Terahertz imaging using quantum cascade lasers**a review of QCL, Terahertz imaging, microbolometer, camera, Tsurupica lens, FLIR A20M microbolometer camera under illumination via the QCL with average power less **Terahertz Imaging Via a Microbolometer Camera Under the** THz imaging using a 160x120 pixel FLIR A20M microbolometer camera microbolometer camera under illumination via the QCL with average power less than **Terahertz Imaging Via a Microbolometer Camera Under the** Terahertz Imaging Via a Microbolometer Camera Under the Illumination of a Quantum Cascade Laser. **High Power Quantum Cascade Laser for Terahertz Imaging** Semantic Scholar extracted view of TERAHERTZ IMAGING VIA A MICROBOLOMETER CAMERA UNDER ILLUMINATION OF A QUANTUM CASCADE LASER **Terahertz imaging using quantum cascade lasers---a - IOPscience** laser and a 160 x 120 element microbolometer focal plane array camera, FLIR A20M. Terahertz imaging, quantum cascade laser, microbolometer. 15. .. transmission images through a bar of chocolate of HERSHEY brand. hidden knife blade were clearly seen under THz back-illumination, as shown in Figure. 29(b). **Terahertz imaging via a microbolometer camera under illumination** Moreover, depth information through time-of-flight measurements is not possible The issue of real-time THz imaging requires advances on three fronts: the with a bright quantum cascade laser (QCL) THz source to demonstrate video-rate superconducting NbN micro-bolometer detectors are under development [95]. Laser Beam using Uncooled Microbolometer Camera In this thesis, operation of a 3.4 THz quantum cascade laser (QCL) was successfully .. applications using external illumination [8-10]. . Using equation 2.4, the area under the curve is. **10Dec_Nellas_ - Naval Postgraduate School** This thesis aimed on characterizing a quantum cascade laser (QCL) beam the silicon nitride-based microbolometer camera under illumination via the QCL **Real-time terahertz imaging using a quantum cascade laser and** Real time imaging analysis using a terahertz quantum cascade laser and a of microbolometers of about tens of Hz. This indicates that neither camera should be able Terahertz imaging via a microbolometer camera under illumination of a **TERAHERTZ IMAGING VIA A MICROBOLOMETER CAMERA** quantum cascade laser and an uncooled, 160120 pixel microbolometer camera modified with Picarin op- tics. Noise equivalent temperature difference of the camera in the 15 THz frequency range was the need for external THz illumination when imaging in this frequency regime. . under the most liberal of assumptions. **Real-Time Terahertz Imaging Using a Quantum Cascade Laser and** The terahertz (THz) frequency quantum cascade laser (QCL) is a systems) as well as usable dynamic range only below ~3 THz. . 2D projection images taken from different illumination angles using a At THz frequencies this most commonly requires the use of microbolometer or pyroelectric arrays, **Terahertz and Infrared Quantum Cascade Lasers, and Real-time** This thesis aimed on characterizing a quantum cascade laser (QCL) beam the silicon nitride-based microbolometer camera under illumination via the QCL **Real-Time Transmission-type Terahertz Microscope, with Palm size High Power Quantum Cascade Laser for Terahertz Imaging - Naval** a 2.7 THz (110 m) quantum cascade laser source and optically microbolometer cameras for THz imaging using quantum illumination is a necessary prerequisite for successful imaging at THz imaging of objects under certain scenarios. **Terahertz Imaging Via a Microbolometer Camera Under the** quantum cascade laser and an uncooled, 160120 pixel microbolometer camera modified with Picarin op- tics. Noise equivalent temperature difference of the camera in the 15 THz frequency range was the need for external THz illumination when imaging in this frequency regime. . under the most liberal of assumptions. **High Power Quantum Cascade Laser for Terahertz Imaging** 2.7-THz QCL radiation and imaged with microbolometer camera. (c) . Colorized frame capture of IR-160 camera under illumination by 2.8 THz OPO beam (with **Terahertz and Infrared Quantum Cascade Lasers, and Real-time** a quantum cascade laser (QCL) beam and achieving high quality real-time THz imaging using a 160x120 pixel FLIR A20M microbolometer camera designed **Bi-material terahertz sensors**

using metamaterial - OSA Publishing Official Full-Text Publication: Terahertz Imaging Via a Microbolometer Camera Under the Illumination of a Quantum Cascade Laser on ResearchGate, the **Terahertz imaging via a microbolometer camera under - Core** characterized using FTIR spectroscopic techniques as part of this thesis. Spectral Terahertz imaging, quantum cascade laser, microbolometer. 15. NUMBER OF 120 element microbolometer focal plane array camera, FLIR A20M. The off-axis .. Eight-bit intensity images of the laser illuminated target, background, and.