288
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Title:Sensitivity of a vanadium oxide uncooled microbolometer array for terahertz imaging
Authors:Coppinger, Matthew (1); Sustersic, Nathan A. (1); Kolodzey, James (1); Allik, Toomas H. (2)
Author affiliation:(1) University of Delaware, Department of Electrical and Computer Engineering, Newark, DE 19716, United States; (2) Active EO Inc., 903 Dalebrook Drive, Alexandria, VA 22308, United States
Corresponding author:Coppinger, M.(mattc@udel.edu)
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Abstract:The broadband imaging capabilities of a vanadium oxide microbolometer camera were investigated in the far-infrared for applications in real-time terahertz imaging and analysis. To accomplish this, we used an optical configuration consisting of a broadband terahertz source, terahertz filtering optics, and a modified commercial broadband microbolometer camera. A blackbody radiator was employed as the broadband terahertz source to illuminate the microbolometer array with all components in a nitrogen purged enclosure. Data was taken using several different levels of radiant flux intensity. Optical filtering were necessary to isolate incident radiation frequencies into a band from 1.5 to 7.5 THz. Fourier transform infrared spectroscopy was used to characterize the transmission properties of each optical component. The noise equivalent differential temperature (NEDT) and the noise equivalent power (NEP) were recorded over a range of blackbody intensities. We discuss the relative utility of these two figures of merit for terahertz imaging. For example, at a blackbody temperature of 925^{o}C the NEDT was recorded below 800 mK, and the NEP was calculated to be 136 pW/Hz. This study provides a complete analysis of a microbolometer as the detector component of a terahertz imaging system in a broadband imaging configuration.
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