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Terahertz microbolometers based on disordered GaAs and GaN heterostructures KAI WANG, University at Buffalo, SUNY, R. RAMASWAMY, A. MURAVIEV, A. SERGEEV, V. MITIN, R. GASKA, Sensor Electronic Technology, Inc. — We present our results on design, fabrication, and characterization of hot-electron bolometers based on low-mobility two-dimensional electron gas (2DEG) heterostructures for THz heterodyne detection. Microbolometers based on GaAs/AlGaAs and GaN/AlGaN heterostructures have been fabricated and tested. Low contact resistances (0.2 ohm-mm for GaN and 0.7 ohm-mm for GaAs) were achieved. We determined the carrier concentration from the Hall measurements and the electron relaxation time from the mobility measurements. We also investigated kinetic parameters: temperature derivate of the resistivity and the electron cooling time. Optical characterization includes the transitivity measurements. The results show that the coupling to the THz radiation is mainly due to the Drude absorption, which increases in disordered structures. Temperature-dependent resistivity and electron cooling are determined by inelastic electron scattering on optical phonons. Finally, we compare GaAs and GaN microbolometers and analyze their parameters for various applications in THz sensing.

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