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Graphene quantum dots for high-performance THz hot electron bolometers[1] A EL FATIMY, P HAN, Department of Physics, Georgetown University, Washington DC, 20057, R.L MYERS-WARD, A.K BOYD, K.M DANIELS, U.S. Naval Research Laboratory, Washington, DC 20375, A.B SUSHKOV, D DREW, Department of Physics, University of Maryland, Maryland, 20742, USA, D.K GASKILL, U.S. Naval Research Laboratory, Washington, DC 20375, P BARBARA, Department of Physics, Georgetown University, Washington DC, 20057 — We study graphene quantum dots patterned from epitaxial graphene on SiC with a resistance strongly dependent on temperature. The combination of weak electron-phonon coupling and small electronic heat capacity in graphene makes these quantum dots ideal hot-electron bolometers. We characterize their response to THz radiation as a function of dot size, with sizes ranging from 30 to 700 nm and temperature, from 2.4K to 80K. We show that quantum dots exhibit a variation of resistance with temperature higher than 430 MΩ/K below 6K, leading to electrical responsivities for an absorbed THz power above 110^{10} V/W. The high responsivity, the potential for operation above 80 K and the process scalability show great promise towards practical applications of graphene quantum dot THz detectors. [1]A. El Fatimy, R.L.Myers-Ward, A.K. Boyd, K.M. Daniels, D. K. Gaskill, and P. Barbara, Nature Nanotechnology, Accepted (2015).

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