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Terahertz Imaging and Spectroscopy of Large-Area Single-Layer Graphene[1] ETHAN MINOT, JOE TOMAINO, ANDREW JAMESON, JOSHUA KEVEK, MICHAEL PAUL, Oregon State University, AREND VAN DER ZANDE, ROBERT BARTON, PAUL MCEUEN, Cornell University, YUN-SHIK LEE, Oregon State University — The high electron mobility of graphene points to potential for high-speed electronic and opto-electronic devices operating at terahertz (THz) switching rates. Therefore, there is great interest in probing the electronic properties of large-area graphene at ultrafast time scales. We have demonstrated THz imaging and spectroscopy of a 15x15-mm^2 single-layer graphene film using broadband THz pulses. The THz images clearly map out the THz carrier dynamics of the graphene-on-Si sample, allowing us to measure sheet conductivity with sub-mm resolution without fabricating electrodes. The THz carrier dynamics are dominated by intraband transitions and the THz-induced electron motion is characterized by a flat spectral response. A theoretical analysis based on the Fresnel coefficients for a metallic thin film shows that the local sheet conductivity varies across the sample from 1.7 – 2.4 x 10^{-3} Ohm^{-1} (sheet resistance 420 - 590 Ohm/sq).

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