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Title:Graphene field-effect transistors as room-temperature terahertz detectors
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Abstract:The unique optoelectronic properties of graphene make it an ideal platform for a variety of photonic applications, including fast photodetectors, transparent electrodes in displays and photovoltaic modules, optical modulators, plasmonic devices, microcavities, and ultra-fast lasers. Owing to its high carrier mobility, gapless spectrum and frequency-independent absorption, graphene is a very promising material for the development of detectors and modulators operating in the terahertz region of the electromagnetic spectrum (wavelengths in the hundreds of micrometres), still severely lacking in terms of solid-state devices. Here we demonstrate terahertz detectors based on antenna-coupled graphene field-effect transistors. These exploit the nonlinear response to the oscillating radiation field at the gate electrode, with contributions of thermoelectric and photoconductive origin. We demonstrate room temperature operation at 0.3 THz, showing that our devices can already be used in realistic settings, enabling large-area, fast imaging of macroscopic samples. © 2012 Macmillan Publishers Limited. All rights reserved.
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Uncontrolled terms:Antenna-coupled - Electromagnetic spectra - Fast imaging - Gate electrodes - High carrier mobility - Macroscopic sample - Non-linear response - Optoelectronic properties - Photonic application - Photovoltaic modules - Plasmonic devices - Radiation field - Room temperature - Room-temperature operation - Terahertz detectors - Terahertz region - Transparent

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