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Title:Time-resolved ultrafast photocurrents and terahertz generation in freely suspended graphene
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Abstract:Graphene, a two-dimensional layer of carbon atoms, is a promising building block for a wide range of optoelectronic devices owing to its extraordinary electrical and optical properties, including the ability to absorb ~2% of incident light over a broad wavelength range. While the RC-limited bandwidth of graphene-based photodetectors can be estimated to be as large as 640 GHz, conventional electronic measurement techniques lack for analysing photocurrents at such frequencies. Here we report on time-resolved picosecond photocurrents in freely suspended graphene contacted by metal electrodes. At the graphene-metal interface, we demonstrate that built-in electric fields give rise to a photocurrent with a full-width-half-maximum of ~4 ps and that a photothermoelectric effect generates a current with a decay time of ~130 ps. Furthermore, we show that, in optically pumped graphene, electromagnetic radiation up to 1 THz is generated. Our results may prove essential to build graphene-based ultrafast photodetectors, photovoltaic cells and terahertz sources.
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Inspec controlled terms:graphene - high-speed optical techniques - photoconductivity - photodetectors - terahertz waves
Uncontrolled terms:time resolved ultrafast photocurrent - terahertz generation - freely suspended graphene - 2D layer - optoelectronic devices - RC limited bandwidth - graphene based photodetectors - graphene-metal interface - photovoltaic cells - terahertz source - C
Inspec classification codes:A7240 Photoconduction and photovoltaic effects; photodielectric effects - A0762 Detection of radiation (bolometers, photoelectric cells, i.r. and submillimetre waves detection) - A7847 Ultrafast optical measurements in condensed matter - A7865V Optical properties of fullerenes and related materials (thin films/low-dimensional structures)
Chemical indexing:C/el

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