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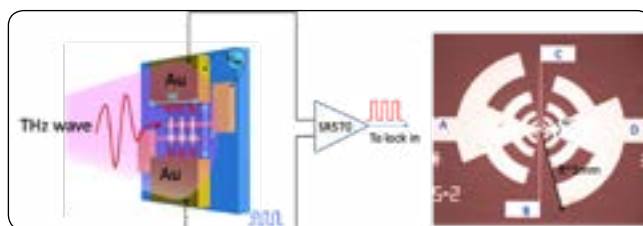
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## Towards sensitive terahertz detection via thermoelectric manipulation in graphene transistors

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Graphene has been highly sought-after as a potential candidate for hot electron terahertz (THz) detection benefiting from its strong photon absorption, fast carrier relaxation and weak electron-phonon coupling. Nevertheless so far graphene based thermoelectric THz photo detection is still hindered by the low responsivity owing to the relatively low photo-electric efficiency. In this work, we provide a straightforward strategy for the enhanced THz detection based on antenna-coupled CVD graphene transistors with the introduction of symmetric paired fingers. This design enables switchable photo detection modes by controlling of the interaction between the THz field and free hot carriers in graphene channel through different contacting configurations. Hence a novel bias field effect can be activated which leads to a drastic enhancement in THz detection ability with responsivity up to 280 V/W and Johnson-noise limited minimum noise-equivalent power (NEP) of 100 p W/Hz<sup>0.5</sup> at room temperature. The mechanism of the enhancement of the photoelectric gain is attributed to the thermo photovoltaic instead of the plasma self-mixing effects; our results offer a promising alternative route to scalable, wafer-level production of high performance graphene detectors.



### Recent Publications:

1. Liu D, et al. (2018) Efficient Raman enhancement on high-quality ultra-clean graphene quantum dots produced by a quasi-equilibrium plasma-enhanced chemical vapor deposition. *Nature Communications* 9:193.
2. Liu C, et al. (2018) Towards sensitive terahertz detection via thermoelectric manipulation in graphene transistors. *NPG Asia Materials* 10:318-327.
3. Du L, et al. (2018) Thickness-controlled direct growth of nanographene and nanographite film on non-catalytic substrates. *Nanotechnology* 29(21):215711.
4. Sun F, et al. (2018) Optical waveguide of buckled CdS nanowires modulated by strain engineering. *ACS Photonics* 5:746-751.
5. Du L, et al. (2017) Formation of Self-connected Si<sup>0.8</sup>Ge<sup>0.2</sup> lateral nanowires and pyramids on Rib-patterned Si (1 1 10) substrate. *Nanoscale Research Letters* 12:70.

### Biography

Gang Chen has his expertise in growth of semiconductor materials and the fabrication of opto electronic devices. He received his PhD on Condensed Matter Physics from Fudan University, Shanghai, China in 2002. Then he had been working at the Institute of Solid State Physics in Johannes Kepler University, Linz, Austria for ten years on the MBE growth of SiGe based nanostructures and their application in the optoelectronics. Now he is a Professor in Chinese Academy of Sciences, Shanghai Institute of Technical Physics. He has published more than 60 research papers in peer-reviewed journals. His main research interest is on the field of the fabrication low dimensional carbon allotrope and their application on ultra-broad photo detection.

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