

Accepted Manuscript

Room-temperature photoconduction assisted by hot-carriers in graphene for sub-terahertz detection

Changlong Liu, Lin Wang, Xiaoshuang Chen, Jing Zhou, Weida Hu, Xinran Wang, Jinhua Li, Zhiming Huang, Wei Zhou, Weiwei Tang, Gangyi Xu, Shao-Wei Wang, Wei Lu

PII: S0008-6223(18)30020-4

DOI: [10.1016/j.carbon.2018.01.020](https://doi.org/10.1016/j.carbon.2018.01.020)

Reference: CARBON 12761

To appear in: *Carbon*

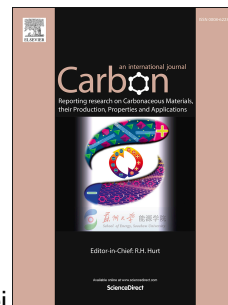
Received Date: 30 June 2017

Revised Date: 4 October 2017

Accepted Date: 4 January 2018

Please cite this article as: C. Liu, L. Wang, X. Chen, J. Zhou, W. Hu, X. Wang, J. Li, Z. Huang, W. Zhou, W. Tang, G. Xu, S.-W. Wang, W. Lu, Room-temperature photoconduction assisted by hot-carriers in graphene for sub-terahertz detection, *Carbon* (2018), doi: 10.1016/j.carbon.2018.01.020.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Graphical Abstract: In this article, we investigate the origins of the photocurrent response in a biased homogeneous graphene device coupled with a log-periodic antenna at room temperature. In such a simple configuration, the photocurrent generation follows neither the plasma wave rectification nor the bolometric mechanism, whilst hot-carrier assisted photoconduction dominates even when the photon energy is far below the inter-band threshold. When the electromagnetic radiation is absorbed by the free carriers in graphene, injection of electrons from the electrode depletes or the sheet density increases, due to the fast electron-hole recombination or generation driven by hot carrier effect. The extra generated carriers in combination with a trap-free interface enable significant photoconductive gain of $\sim 10^4$ and high electrical bandwidth of $\sim 10^6$ Hz (response time ~ 1 μ s).

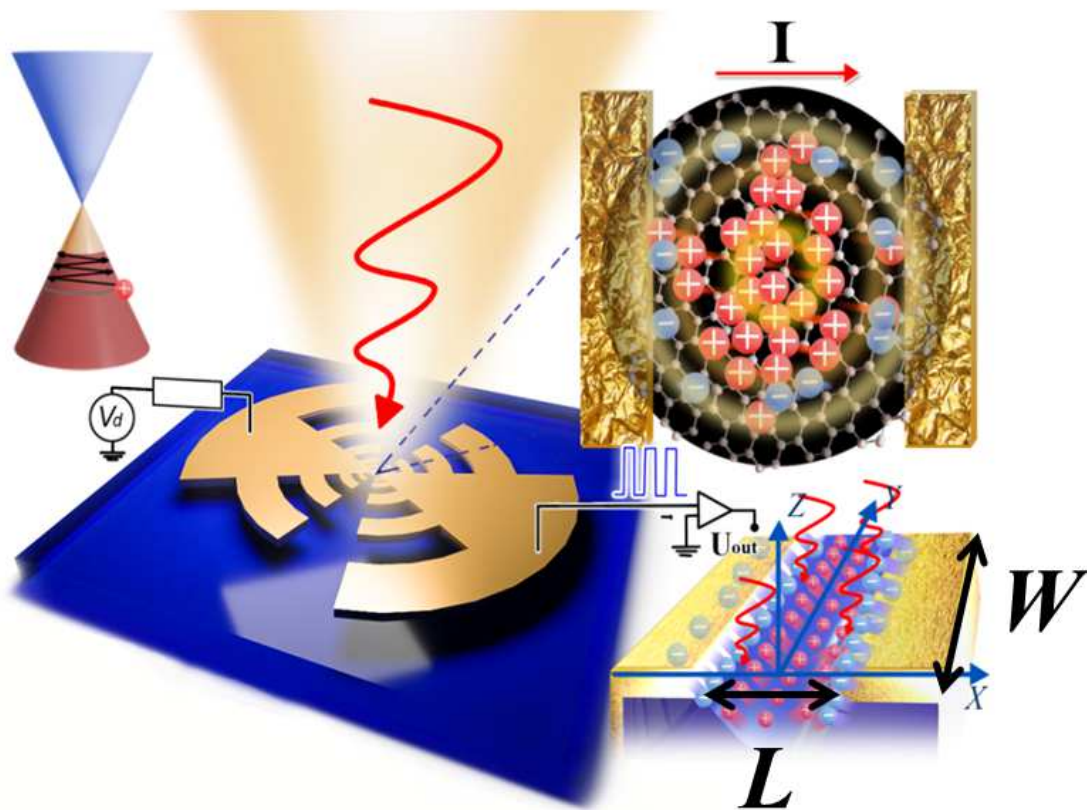


Figure 1. Schematics of the antenna integrated graphene-photoconductor and its photon-detection principle: the hot carrier assisted photoconductive effect.

Download English Version:

<https://daneshyari.com/en/article/7848507>

Download Persian Version:

<https://daneshyari.com/article/7848507>

[Daneshyari.com](https://daneshyari.com)