Optoelectronics and Plasmonics with hBN-Encapsulated Graphene

James Hone

Columbia University, New York NY, USA

jh2228@columbia.edu

The creation of ultraclean heterostructures in which graphene is encapsulated by hBN enables reaching the regime of intrinsic properties, such as room-temperature mobility exceeding 10^5 cm^2/Vs [1]. This talk will first review our efforts (with Englund, MIT and others) to explore the potential of hBN-encapsulated graphene for optoelectronic devices. These include high performance photodetectors [2], modulators [3], and thermal emitters [4]. Recent work exploring the speed and sensitivity limits of these structures will be discussed. In collaboration with Koppens and Hillenbrand (ICFO) and Basov (UCSD) we have likewise explored the potential for improved performance and new phenomena in graphene plasmonics [5]. This includes photo-induced phenomena [6], and thermoelectric detection of plasmons [7,8,9]

References

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Figures

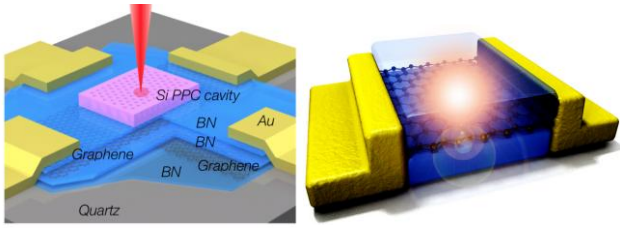

Figure 1: Optoelectronic structures. (left), high-frequency modulator. (right) thermal light emitter.

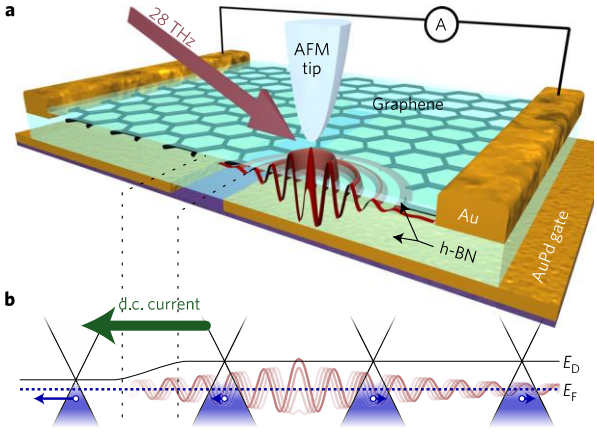

Figure 2: Thermoelectric detection of plasmon resonances in a graphene p-n junction structure