

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Retardation effect in graphene plasmonics HUGEN YAN, IBM T. J. Watson Research Center — Localized plasmons in graphene micro- and nano-structures have attracted lots of attention recently. Typically the size of the graphene structure is much smaller than the on-resonance light wavelength and the quasi-electrostatic treatment of the light-matter interaction is sufficient. However, with increasing graphene structure size and stacked layer thickness, the quasi-electrostatic treatment fails. Retardation effect and dynamic depolarization have to be taken into account. In the paper, we'll focus on two major topics related to the retardation effect. First, ultralow damping of graphene plasmons can be achieved in ultra-large graphene disk and ribbon arrays. Second, the coupling of graphene structures in the same array is radiative in nature and the resonance associated with the periodic lattice of the graphene disk or ribbon arrays play an role in the plasmonic response.

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Date submitted: 13 Nov 2014

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