

Theory for UV to THz light conversion using graphene nano-ribbons

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In this presentation, we propose application of graphene nano-ribbons, which can be formed by bottom-up growth technology[1], for modulating intensity of UV optical field with THz frequency. We have performed the real-time propagation TDDFT simulation of electron of graphene nano-ribbon with presence of optical field, and monitored the induced field by electron motion in the nano-ribbon. We then observed significant field enhancement when the frequency of incident optical field is in UV region and the enhancement occurs with 100 fs period (10 THz frequency).[2]

In this presentation, we discuss the mechanisms of such large field enhancement as well as THz modulation, and propose application of graphene nano-ribbons for THz radiation.

This work was supported by Science of Atomic Layers (SATL), Grant-in-Aid for Scientific Research for Innovative Areas by MEXT, Japan

[1] J. Cai *et al.*, Nature **466**, 470-473 (2010)

[2] H. Zhang, Y. Miyamoto, X. Cheng, A. Rubio, Nanoscale **7**, 19012-19017 (2015)