Graphene heterostructures: peculiarities of microwave and THz response

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Recently, we demonstrated that graphene can provide an efficient far-field shielding against microwave radiations [1,2] allowing one to achieve up to 50% absorption of the incident radiation, depending on the number of graphene sheets and doping level. Here we discuss different possibilities to enhance graphene/polymer absorption ability in wide frequency range, from microwaves to THz, up to perfect, 100%, absorption. For that substrate of proper thickness and dielectric properties supported graphene sample, as well as an optimal incidence angle of electromagnetic radiation can be used. We demonstrate both theoretically [3,4] and experimentally that the increase of the grain size of the CVD graphene from 20 to 400 microns does not affect the electromagnetic interference shielding performance of graphene/polymer heterostructure. The possibilities to tune electromagnetic response of graphene/polymer sandwich by changing the incidence angle for s-polarized wave in THz range, by electrostatic doping as well as mechanical strengths and deformations are also addressed in this communication.

Graphene and other ultra-thin carbon coatings [5] coating allowed generation of powerful microwave pulses of long duration, up to microseconds along with high efficiency (due to the low velocity scatter electrons emitted from the cathode)

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