

SURFACE PLASMON-POLARITONS IN GRAPHENE LAYER: DISPERSION RELATION AND EXCITATION BY ATTENUATED TOTAL INTERNAL REFLECTION METHOD

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In the paper we consider theoretically surface plasmon-polaritons (SPPs) in single graphene layer, surrounded by two semi-infinite dielectric media. The SPP dispersion relation was obtained in the self-sustaining way using the expression for the graphene conductivity, obtained earlier in [1]. It is shown, that the peculiarity of SPP dispersion relation in graphene (compared to the usual 2D electron system) is the existence of SPP at frequencies less than some critical frequency, whose value is approximately proportional to the chemical potential of graphene. Dealing with problem of SPP excitation, the possibility to excite the SPP in single graphene layer in the long-wavelength range using the attenuated total internal reflection method is shown. We demonstrate that in the case of graphene the parameters of the SPP excitation (like frequency, reflectivity of attenuated total internal reflection scheme) can be tuned by applying the gate voltage to the graphene layer.

References

- [1] T. Stauber, N. M. R. Peres, and A. K. Geim, PRB 78, 085432 (2008)