

Optical Doping of Epitaxial-Graphene: The Role of the Electric Field in the Substrate

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Because of its technologically simple and inexpensive fabrication, epitaxial graphene grown on silicon carbide substrates is a good candidate for being a common material used in electronics and photonics. However, efforts to create graphene transistors, in which the epitaxial graphene forms the source-drain channel with back-gate voltage-controlled conductivity, have not been very successful so far. We propose a promising alternative to back-gating in the form of additional optical doping of graphene with a photoinduced space charge in the substrate that affects the graphene sheet conductivity. In addition to electrical measurements of the photoresponse of graphene and SiC, a novel method of internal electric field measurements will be used. The talk mainly focuses on the role of the space charge and the electric field distribution in the SiC substrate in graphene conductivity and how to control it.