

Tunable Metal-Graphene and Graphene-GaSe Devices

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Graphene and other 2D materials have unique properties that have made them hot topics not just in scientific research but also in the development of new types of applications in photonics and electronics. Unlike most 2D materials semimetallic graphene lacks bandgap needed in a number of applications. Especially interesting for devices are hybrid materials based on different 2D materials, such as graphene/GaSe [1] and BN/MoS₂, which combine the benefits and possibilities of dissimilar materials. These ultrathin, transparent devices open new opportunities, e.g., for flexible sensing and displays.

In this presentation studies of tunable 2D materials based on metal-graphene interface [2,3] and graphene–GaSe–graphene heterojunction device [1] will be shown. Our graphene-GaSe device configuration uses multilayer 2D materials with CVD graphene as a contact material. The gate electrodes placed on top of the graphene contacts on GaSe modulate only the Fermi energy of graphene allowing tunable contact. Transport measurements revealed promisingly strong current rectification and a high on/off ratio in the devices. In addition, GaSe and GaTe are attractive 2D materials for optoelectronics as demonstrated by recent SHG and THG measurements [4,5].

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