DeMeGRaS: Detection mechanisms in graphene radiation sensors

Main area: Sensors from GRMs and their heterostructures
Keywords: THz technology; graphene; plasma waves; THz detectors; thermoelectric effects
Duration: 36 months
Total project funding: € 797.000

Abstract

The main detection mechanisms of the ac-current rectification in THz graphene radiation sensors will be studied, by conducting systematic experiments on devices with different layouts and materials in combination with graphene, at frequencies from sub-THz to infrared range and wide temperature range from 4K up to room temperature. Fundamental aspects of terahertz radiation-graphene interaction and, in particular, interplay of the thermoelectric and plasmonic (Dyakonov-Shur) mechanisms of terahertz-radiation detection will be investigated, with an eye to optoelectronic applications. The layouts and materials will be tailored to favour a particular target detection mechanism using industry compatible processes. The optimal layout of the room-temperature radiation sensors will then be designed- and tested, in which two- or several detection mechanisms will contribute constructively to the output signal, thereby allowing for the maximum responsivity and minimum noise. The identification of the main detection mechanisms and development of optimized detectors will also promote new designs of other high frequency graphene devices like THz mixers and fast focal plane imaging arrays.

Consortium

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