

DESCRIPTION FOR THE GENERAL PUBLIC

The main objective of the project is to study the electronic properties and electronic carriers transport in graphene / transition metals dichalkogenides (TMDCs) hybrid systems. Graphene is a material that has unique properties allowing for the movement of charge carriers at very high speeds. At the same time it has extraordinary strength and flexibility. Moreover, what is highly important for the scope of the project, spin-labeled charge carriers can travel in graphene distances comparable to those encountered in superconductors. This makes graphene an interesting system for applications in spintronics. Unfortunately, the use of graphene in electronics and spintronics is limited due to the fact that this material does not have an energy gap. On the other hand TMDCs have a band gap and spin separated energy bands which make them attractive for spintronics applications. Unfortunately, the presence of structural defects causes small mobility of charge carriers in TMDCs. The project will focus on the possibility of combining both mentioned materials. The combination of graphene with TMDCs can create a new class of hybrid materials in which spin polarized charge carriers can be created and transported without scattering. This type of modern hybrid materials would help in the future to develop the next generation of computer systems. However, before it will be possible fundamental studies of those materials and the description the mechanisms of charge carriers transport at the nanoscale are necessary. Such investigation will be the scope of the project.