The project is a part of the vigorously growing area of semiconducting two-dimensional crystals, which was initiated by a discovery of graphene. So far, the interest of researchers have been focused mainly on the semiconducting layered materials, such as transition metal dichalcogenides (*e.g.* MoS_2, WS_2, $MoSe_2$, WSe_2 and $MoTe_2$) or metal monochalcogenides (e.g. InSe, Gase, GaS and GaTe), which properties vary extremely in the transition from the bulk crystal to a single atomic layer. In particular, the character of their band gaps changes from the indirect to direct one.

In this project are proposed research of excitonic complexes in two types of samples: (i) high quality thin layers of different members of aforementioned materials obtained by their encapsulation in hexagonal BN, (ii) artificially stacked van der Waals (vdW) heterostructures of at least two different layered materials, *e.g.* WSe_2 and InSe, where a new complexes of excitons may be apparent. Therefore, the materials may have practical applications in the field of optoelectronics and photovoltaics, as their band gaps cover broad electromagnetic range from UV to NIR. Within the project, there are planned investigation using various spectroscopic techniques, such as photoluminescence, reflectance contrast and Raman scattering, and under different conditions, *i.e.* as a function of temperature and in external magnetic fields.

The aim of the project is broaden the knowledge of the properties of the different excitonic complexes formed in thin layers of studied materials. Excitons as associated with the excitation of carriers in materials are very interesting complex from fundamental and potential applications points of view. This study will enable a better understanding of formation of excitons and coupling between thin layers in vdW heterostructures.