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 transition metal dicalcogenides, such as MoS_2, WS_2, $MoSe_2$, WSe_2, and $MoTe_2$, which properties vary extremely in the transition from the bulk crystal to a single atomic layer. In particular, the band gap changes from the indirect to direct one, which leads to a number of interesting properties, *e.g.*, binding energy of exciton is on the order of hundreds of mili electronvolts. In this project are proposed research of a relatively new group of layered materials, which are semiconducting transition metal monochalcogenides, which include over more than a dozen well-known compounds. Whereas for this project four materials have been selected, such as InSe, Gase, GaS and GaTe. Particularly, indium selenide is a very interesting material, which has a direct band gap in the range of the near infrared in the bulk form of the material, which increases with decreasing thickness and appears in the range of visible light (near the yellow color) for a few atomic layers. Therefore, the materials may have practical applications in the field of optoelectronics and photovoltaics.

The aim of the project is broaden the knowledge and the understanding of the nature of the interaction between excitons and phonons in proposed layered materials. Excitons are associated with the excitation of carriers in the material, and phonons determine the dynamics of the crystal lattice. Within the project, there are planned investigation of both the material and the thin atomic layers of semiconducting transition metal monochalcogenides using various spectroscopic techniques, and under different conditions, *e.g.*, as a function of temperature. This study will enable a better understanding of exciton-phonon interaction in this new group of semiconductors.