

In the framework of this project, new semiconductor materials will be grown epitaxially using the molecular beam epitaxy method. It will be group-III nitride alloys with a small content of arsenic, which we call III-N(As) diluted with arsenic. Because of the fact that III-N semiconductors are found in the wurtzite structure and III-As semiconductors in the zinc blend structure we expect that mixing of these two material groups will lead to alloys that will be characterized by unusual optical and electrical properties due to changes in the band structure. The aim of this project is to carry out systematic structural, optical and electrical studies for III-N(As) alloys as well as their quantum wells and heterostructures. This will be deep fundamental research aimed to understand the physical properties of III-N(As) compounds and structures containing these material combinations with small As-content that have not been produced so far and which can have a large potential in applications in semiconductor devices such as light emitters or high power transistors. Due to the fact that it is a technology based on gallium nitride, which revolutionized the lighting industry (Nobel Prize in physics in 2014 - Prof. Isamu Akasaki, Prof. Hiroshi Amano and Prof. Shuji Nakamura), we expect that the proposed research will have large importance in the further development of light emitters and high temperature electronics. It could be shown recently by the group of the applicant, that indeed arsenic is incorporated into the GaN lattice and therefore the goals are realistic.