

The goal of this project are studies of the electronic band structure and optical properties of novel semiconductor materials and quantum wells grown on GaSb. It will be ternary and quaternary alloys composed of such compounds as GaSb, InSb, InAs, GaBi, and InBi. Such materials can be applied in semiconductor lasers operating in the mid-infrared spectral region i.e., 3-8  $\mu\text{m}$ . This spectral range is very interesting since a lot of molecules have absorption bands in this spectral range. Therefore semiconductor lasers emitting at different wavelengths in this spectral range can be used to build devices, which measure the content of molecules in air etc. Currently GaInAsSb/GaSb quantum wells are mainly used in mid-infrared lasers. But such quantum well system does not confine holes in the valence band with moving to longer wavelengths. One of goals of this project is to find such alloys for which quantum confinement will be strong in both the valence and conduction band. We suppose that incorporation of bismuth into (Ga,In)(As,Sb)/GaSb quantum wells will enhance quantum confinement in the valence band. A verification of this hypothesis is one of goals of this project.