DESCRIPTION FOR THE GENERAL PUBLIC

The development of bulk $A^{III}B^{V}$ materials technology e.g. InAsSb, AlAsSb (6.1 Å family) enables a design of infrared (IR) structures archiving higher operation temperature HOT T=200−300 K. In terms of the covalent bonding $A^{III}B^{V}$ compounds may theoretically operate at higher temperatures in comparison with HgCdTe (MCT - *mercury cadmium telluride*), where ionic bonding is dominating. This gives a potential for $A^{III}B^{V}$ materials to be implemented in many higher operation temperature applications. The presented subject is one of the main research challenges of today's semiconductor physics particularly applied to IR detectors optimized for the 3−5 µm (MWIR - *medium wavelength infrared radiation*) and 8−14 µm (LWIR - *long wavelength infrared radiation*) spectral ranges.

During the fabrication process the mesa sidewalls are exposed to ambient atmosphere. InAsSb will react with atmospheric oxygen and form native antimony, indium and arsenic oxides. Some of these oxides are conductive in nature, which results in creating a surface leakage path which contribute to increase dark current.

Taking this into consideration the main goal of the proposed project is to develop a technology of reduction leakage current in high operating temperatures InAsSb bariode on GaAs substrates obtained via molecular beam epitaxy (MBE). I expected that an appropriate passivation layer will decrease dark current by 2 orders of magnitude at 200−300 K temperature range.

Our researches will be composed of:

- the growth of bariode $InAs_xSb_{1-x}$ structures on GaAs substrate by MBE;
- dry and wet processing mesa structures;
- passivation of mesa sidewalls via sputtering and chemical techniques;
- characterization of the fabricated detectors