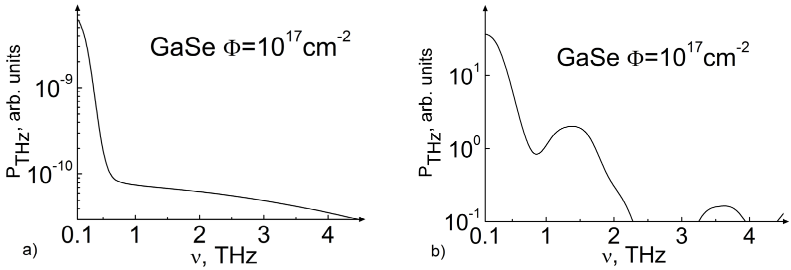
At the positive potentials on the gate, the electrons are injected from silicon into titanium oxide. Even at small voltage bias the barrier at the TiO_2-n-Si interface become insignificant and all voltage is applied to the dielectric. Current through the sample is determined by processes in TiO_2 film. From the analysis of current-voltage characteristics it follows that the conductivity of TiO_2 films is determined by the space charge limited current in a dielectric with traps which are exponentially distributed in band gap. At negative potentials on the gate, the space charge region (SCR) is formed in the silicon and the bias voltage is distributed between the TiO_2 film and SCR in silicon. Current through the structure is determined by the electron-hole pairs generation in the SCR.

TERAHERTZ GENERATION FROM SURFACES OF ELECTRON AND NEUTRON IRRADIATED SEMICONDUCTORS

Bereznaya S.A.[1], Korotchenko Z.V.[1], Red'kin R.A.[1], Sarkisov S.Yu.[1], Brudnyi V.N.[2], Kosobutsky A.V.[2,3], Atuchin V.V.[1,4,5]

[1]Functional Electronics Laboratory, Tomsk State University, Tomsk, Russia
[2]Nanolectronics and Nanophotonics Laboratory, Tomsk State University, Tomsk, Russia
[3]General Physics Department, Kemerovo State University, Kemerovo, Russia
[4]Laboratory of Optical Materials and Structures, Institute of Semiconductor Physics, SB RAS, Novosibirsk, Russia
[5]Laboratory of Semiconductor and Dielectric Materials, Novosibirsk State University, Novosibirsk, Russia, atuchin@isp.nsc.ru

Terahertz generation from semiconductor surfaces is one of the most simple and efficient methods of obtaining terahertz radiation within 0.1-3.5 THz range for terahertz time-domain spectroscopy (THz-TDS). Terahertz pulse arises from ultrafast current transient produced by non-equilibrium charge carriers excited by femtosecond laser pulse and accelerated by surface built-in field or by diffusion process. This process is complex and depends on different fundamental properties of semiconductor crystal. It is still difficult to extract the semiconductor properties from terahertz emission data. On the other hand, a qualitative characterization can be performed. In the present study, we test the terahertz emission from semiconductors (InAs, GaAs, GaSe, InP, InSb) with important parameters, like carrier lifetimes or mobilities, differing by orders of magnitude. We perform also simple modeling of the terahertz emission spectra. One of the ways to change these parameters is a high-energy particle irradiation. In this work, the electron- and neutron-irradiated III-V and III-VI semiconductors are compared. Examples of terahertz spectra emitted from surface of electron irradiated GaSe are demonstrated on figures below.



Model (a) and experimental (b) terahertz emission spectra from electron irradiated GaSe sample.

PHOTOELECTRICAL CHARACTERISTICS OF TiO_2-n-Si HETEROSTRUCTURES

Kalygina V.M.[1], Egorova I.S.[1], Prudaev I.A.[1], Tolbanov O.P.[1], Atuchin V.V.[1,2,3]

[1]*Functional Electronics Laboratory, Tomsk State University, Tomsk, Russia*
[2]*Laboratory of Optical Materials and Structures, Institute of Semiconductor Physics, SB RAS, Novosibirsk, Russia*
[3]*Laboratory of Semiconductor and Dielectric Materials, Novosibirsk State University, Novosibirsk, Russia, atuchin@isp.nsc.ru*

The influence of thermal annealing on photoelectrical properties of TiO_2-n-Si structures is studied. Titanium oxide film with thickness of 70 nm were prepared by magnetron sputtering on Si epitaxial layer with the donor concentration of $N_d = 7\cdot10^{14}$ cm^{-3}. Before deposition of dielectric film the Si wafer was exposed to chemical cleaning. Then, the Si-substrate with dielectric film was separated into several parts. One part was not subjected to annealing, and the two parts were annealed in Ar atmosphere for 30 min at temperatures T_a = 500° and 750ºC. In the study of the photoelectric characteristics the structures were irradiated by LED at λ = 400 nm from the titanium oxide film side. Unlike photodiodes with Schottky barrier and metal-SiO_2-n-Si structures the currents at positive potentials on the gate increase during exposure to radiation, starting with the low voltages. The currents at negative potentials at the gate show significantly greater sensitivity to light. In structures without annealing and after annealing at 500°C, there is a threshold voltage of reverse-