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DIELECTRIC FUNCTIONS, CHEMICAL AND ATOMIC COMPOSITIONS OF THE NEAR SURFACE LAYERS OF IMPLANTED GaAs BY In⁺ IONS

M. Kulik^{1,2}, D. Kołodyńska³, A. Bayramov⁴, A. Drozdziel², A. Olejniczak⁵ and J. Żuk²

¹Joint Institute for Nuclear Research, St. 6 Joliot-Curie, Dubna, Moscow reg., Russia, 141980;

²Institute of Physics, Maria Curie-Skłodowska University, Sq. 1 Maria Curie-Skłodowska, 20-031, Lublin Poland;

³Faculty of Chemistry, Maria Curie-Skłodowska University, Sq. 2 Maria Curie-Skłodowska, 20-031, Lublin Poland;

⁴Institute of Physics, ANAS, AZ-1143, Baku, Azerbaijan;

⁵Faculty of Chemistry, Nicolaus Copernicus University, St. Gagarina 7, Toruń, Poland.

Abstract

The surfaces of (100) GaAs were irradiated with In⁺ ions. The implanted samples were isobaric annealed at 800 °C and then of dielectric function, the surface atomic concentrations of atoms and also the chemical composition of the near surface layers in these implanted semiconductor samples were obtained. The following investigation methods were used: spectroscopic ellipsometry (SE), Rutherford backscattering spectrometry analyses (RBSA) and X-ray photoelectrical spectroscopy (XPS) in the study of the above mentioned quantities, respectively. The change of the shape spectra of the dielectric functions at about 3.0 eV phonon energy, diffusion of In⁺ ions as well as chemical composition changes were observed after ion implantation and the thermal treatment. Due to displacement of Ga ions from GaAs by the In⁺ ions the new chemical compound InAs was formed. The relative amounts Ga₂O₃ and As₂O₃ ratio increase in the native oxide layers with the fluences increase after the thermal treatment of the samples. Additionally, it was noticed that the quantities of InO₂ increase with the increasing values of the irradiated ions before thermal treatment.

Keywords: native oxides, ion implantation, indium ions, gallium arsenide, XPS method, RBS method

*e-mail: mkulik@hektor.umcs.lublin.pl

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