

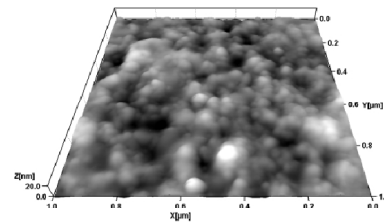
## Topology of Nano-Heterostructures Ag<sub>2</sub>O-HgCdTe

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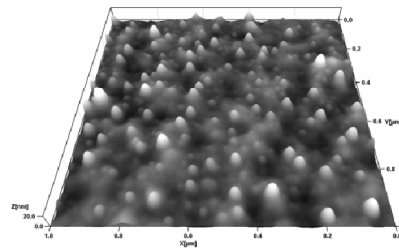
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The samples were irradiated by Ag<sup>+</sup> ions on the side of the HgCdTe (MCT) epilayer ( $d = 17 \mu\text{m}$ ) on “Vezuviy” implanter [1, 2]. The surface morphology of heterostructures, mechanical and electrical properties are studied. It was found that the ion irradiation of the surface of studied specimens gives rise to the formation of a characteristic relief on it. The AFM images of the initial surface of typical heterostructure specimens on the basis of CdHgTe (Figs.1a and 1b) demonstrate a grid of quasipores ( $3.5 \times 10$ ) nm in depth and ( $50 \times 160$ ) nm in diameter, as well as closely packed grains ranging from 40 to 80 nm in dimensions and located in the surface plane between the pores. The implantation with silver ions gives rise to the emergence of a uniform array of nano-islands 5 to 25 nm in height and with a base diameter of 13 to 35 nm against the background of the insignificant smearing of initial grain boundaries and the constant surface porosity (Fig.1a, 1b) [1].

The observed effects of transformation of the defect-impurity system and structuring of the surface of the heteroepitaxial film of the low-energy-gap semiconductor have been explained using a deformation model. The deformation accumulation is found to lead to the topological instability of the irradiated surface. The calculated mechanical stress is  $\sigma_{\text{max}} = 2 \times 10^5 \text{Pa}$  [2]. As a result, each of the local volumes (blocks) of the crystal undergoes an action of forces from the neighboring blocks, and their resulting force and its impulse will not be zero because of fluctuations. When the stress will be higher than the ultimate strength of MCT, the action of the forces can bring about the rotation of small crystalline blocks and the structuring of the material.



a).



b).

Fig 1 AFM images a) initial Cd<sub>x</sub>Hg<sub>1-x</sub>Te b) implanted Ag<sup>+</sup>

1. A.B. Smirnov, O.S. Litvin, V.O. Morozhenko, R.K. Savkina, M.I. Smoliy, R.S. Udovytska and F.F. Sizov, *Ukr.J.Phys.* **58**, (2013), 872.
2. F.F. Sizov, R.K. Savkina, A.B. Smirnov, R.S. Udovytska, V.P. Kladko at ell. *Physics of the solid state.* **56**, (2014), 2160.