Extended Abstracts of the 1991 International Conference on Solid State Devices and Materials, Yokohama, 1991, pp. 305

Investigation of Anodic Film-$Hg_{1-x}Cd_xTe$ Interface

Chaplanov V.A., Galkin I.M., Nefedov A.A.,Shipov I.A.,Yakimov S.S.
I.V.Kurchatov Institute of Atomic Energy, 123182, Moscow, USSR
FAX (095)-1961632

$Hg_{1-x}Cd_xTe$ is a semiconductor compound with great potential for infrared detector application. However, the $Hg_{1-x}Cd_xTe$ surface provides the generation-recombination centers. Consequently, it is necessary to passivate the $Hg_{1-x}Cd_xTe$ surface in order to reduce the surface leakage current as well as to maintain the electrical and chemical stability. A promising technique for passivation of the $Hg_{1-x}Cd_xTe$ surface is anodizing.

Anodic oxide films and CdS films with different thicknesses were produced by anodizing of polar (111)A and $(\bar{1}\bar{1}\bar{1})$B faces of $Hg_{0.775}Cd_{0.225}Te$ single crystals.

Recently a number of new X-ray diffraction methods have been developed in order to investigate the structure of crystal surfaces and interfaces with atomic-scale resolution. One of them has united a high X-ray penetration and a possibility of analysis of the thinnest subsurface layers of crystals. This method called asymptotic Bragg diffraction[1] and crystal truncation rods[2] was used in our experiments.

The interface was found to vary from 0.8 to 2.5 nm in dependence on the crystal faces and the film thickness. Influence of the internal electrical fields on the penetration of ions through the (111)-double atomic layers is discussed on the base of experimental results. It showed itself in the different properties of the crystal polar faces.

1) S.S.Yakimov, V.A. Chaplanov, A.M. Afanas'ev, P.A. Aleksandrov, R.M.Imamov and A.A. Lomov: JETP Lett. 39 (1984) 3.
2) I.K.Robinson: Phys.Rev.B. 33 (1986) 3860.