КАФЕДРА ІНОЗЕМНИХ МОВ

STRUCTURAL PROPERTIES OF THE FILMS $Zn_{1-x}Mn_xTe$

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At present, the interest of specialists working in the field of material science to semimagnetic solid solutions $Zn_{1-x}Mn_xTe$ is growing. Their photoluminescence, magnetic and magneto-optical properties allow to create a number of effective devices for micro-, opto-electronics, solar power engineering, and spintronics

Thin $Zn_{1-x}Mn_xTe$ films were deposited on the treated glass·substrates at no more than $5 \cdot 10^{-3}$ Pa pressure of residual gases in the chamber. The mixed material of a semiconducting purity containing 10% of manganese was evaporated. The temperature of the evaporator was Te = 800 ^oC. The substrate temperature varied within the interval Ts = (150-550) ^oC. The deposition time was normally t = 5-15 min, and the layer thickness was 2-8 μm. Surface morphology of the films was studied using scanning electron microscopy (REMMA-103-01).

Element analysis of the films was carried out using x-ray characteristic radiation induced by a proton beam. The studies were carried out using the electrostatic accelerator «Sokol» with the energy of a beam of protons up to 2 MeV (Institute of Applied Physics, NAS of Ukraine, Sumy). Summary spectra from several areas of the sample surfaces (PIXE) were scanned and then point-by point study was done using the micro-beam (μ-PIXE). Usually, the scanned film area was 200×200 micron. The proton energy was Ep = 1.5 MeV.

It was determined that Zn_1-xMn_xTe thin films with the thickness of about (2 to 8)μm had the grain size D = 0.50 to 1.12μm, which increased with the substrate temperature. The thin films were single-phase with a stable cubic structure. The axial [111] growth of the texture was defined with the help of the inverse pole figure. The orientation factor increased with the substrate temperature rise. The Mn concentration changed with the growth conditions in the range from 1.61-3.04 at. % . Scanning of the film surfaces by the proton (μ-PIXE) revealed the uniform distribution of Mn over their surfaces.

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