DR-58. THE FEATURES OF MORPHOLOGY OF SUPERSATURATED SOLID SOLUTIONS FILMS Cd_xPb_{1-x} SOBTAINED FROM TRIETHANOLAMINE-AMMONIA SYSTEM

A. D. Kutyavina[1], L. N. Maskaeva[1,2], V. F. Markov[1,2]

[1] Ural Federal University of the first President of Russia B. N. Yeltsin, Mira St., 19, Yekaterinburg, 620002, Russia

[2] Ural Institute of State Fire Service of the Ministry of Emergency Situations of Russia, Mira St., 22, Yekaterinburg, 62002, Russia

E-mail: n-kutyavina@mail.ru

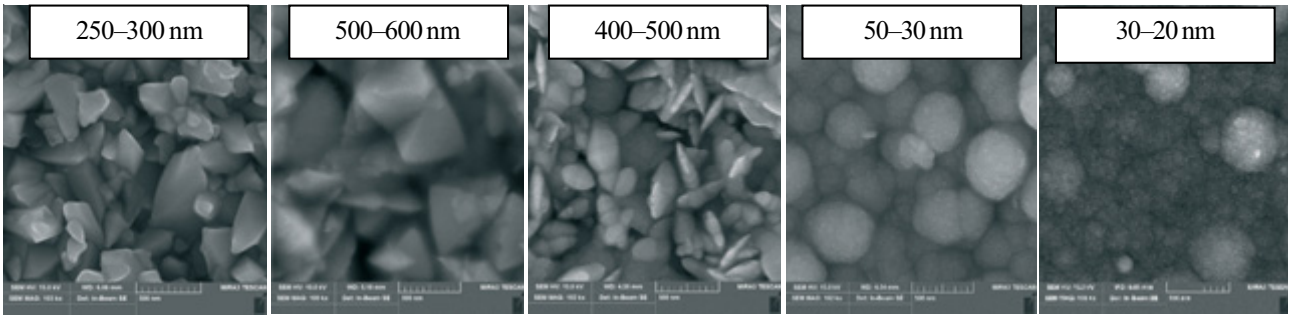
Thin-film solid solutions in the CdS – PbS system are promising optoelectronic materials due to the possibility of regulating structure, morphology and electrophysical properties by varying the proportion of the replacement component. $Cd_xPb_{1-x}S$ films are widely used as components of high-sensitivity photoresistors, high-efficiency solar radiation cells, chemical sensors and elements oflaser.

Chemical bath deposition is simple and does not require complicated equipment, so it is the most accessible method for obtaining thin $Cd_xPb_{1-x}S$ films. In addition, the use of various ligands with different strength and nature makes it possible to regulate the amount of free ionsof metals in the aqueous solutions, which affects the speed and mechanism of the process.

A triethanolamine-ammonia reaction mixtureis considered to determine the morphological features of the surface of CdPbS films from conditions created by the ligand background in the reactor volume during chemical precipitation.

The film of individual PbS (fig. *a*) consists of pyramidal crystallites with dimensions of about 250–300 nm with a fuzzy facet. The surface of the sample CdS (fig. *e*) is relatively homogeneous and covered with spherical globules, the size of which varies from 100 to 500 nm, consisting of smaller particles with size ~ 20–30 nm .

The introduction of the cadmium salt 0,01 mol/l (fig. *b*) into the reaction mixture increaces the size of elements of to 600 nm. Some of particles remain pyramidal, but flocculent aggregates also appear, the number of which increases with increasing $CdCl_2$ content to 0,04 mol / l (fig. *c*). An increase in the cadmium salt in the reaction mixture leads to a decrease in the structural elements (400–500 nm) and the formation of single globules, which is typical of cadmium sulfide (fig. *e*). The film in fig. *d* (0,06 mol/l $CdCl_2$) already consists entirely of spherical clusters with a diameter of 200–300 nm, which are formed from particles of 50–30 nm. In the examined system, two-phase films that are heterogeneous in composition are formed on the surface, containing both low cadmium concentrations and high ones.



a *b* *c* *d* *e*

Electron microscopic images of PbS (*a*), CdS (*e*), and $Cd_xPb_{1-x}S$ films chemically deposited at a temperature of 353 K from the triethanolamine-ammonia system with a lead salt concentration of $PbAc_2$ 0,04 mol/l and different concentrations of $CdCl_2$, mol/l: 0,01 (*b*); 0,04 (*c*); 0,06 (*d*)