SUMMARY

Chaviyak I.I. Growth processes, structure and transport phenomena in Tin Telluride vapor-phase nanocondensates.

The thesis for obtaining the scientific degree of Candidate of Physics and Mathematical Sciences in the specialty 01.04.18 – Physics and Chemistry of Surface – Vasyl Stefanyk Precarpathion National University, Ivano-Frankivsk, 2014.

The basic topological properties of nanostructured surfaces SnTe and SnTe:Bi condensates, obtained by vapor-phase methods ("hot wall" method and free evaporation in vacuum) for various technological factors and deposited on monocrystalline (BaF_2, mica), polycrystalline (sital), and amorphous (polyamide) substratesusing was defined on the base of AFM results. The influence of external fields (annealing in vacuum and atmospheric oxygen, irradiation by alpha particles) on the structural characteristics of Tin Telluride condensates cause to change in the phase composition (tellurium desorption, adsorption of oxygen) so they substructure complex parameters (coherent scattering region, the value of units mosaic, heterogeneous microdeformations, mosaic).

The type and charge state of the dominant defects determined using crystal chemistry approaches. Stable p-type of conductivity is due to vacancies in cation sublattice of basic matrix and after influence of amphoteric dopant.

There were investigating the dependences of electrical parameters of the condensates from the growing conditions, namely, temperature, thickness and structural characteristics. It was receiving the dominant role of scattering on the surface (pure SnTe) and on the both surface and intergrain of nanocrystals (after doping of bismuth).

The conditions of formation of vapor-phase nanocondensates with optimal thermoelectric parameters (thermoelectric power $S^2\sigma \approx 18$ μW/(K^2cm) and ≈ 30 μW/(K^2cm) for pure and Bithmuth doped SnTe, accordingly) was obtained for creating p-elements of micromodules of the thin film thermoelectric generators.

The observed oscillation character in the behavior of thermoelectric parameters in nanostructures based on Tin Telluride explain the quantization of energy carriers by restricting their movement in the potential wall width is determined by the thickness of the condensate d.

Keywords: lead telluride, vapor-phase nanocondensate, surface morphology, structure, thermoelectrics.