RAMAN INVESTIGATION AND ELECTRO-PHYSICAL PROPERTIES OF II-VI WIDE-BAND GAP FILMS

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In recent time II-VI wide-band gap semiconductor compounds, such as ZnS, ZnSe, ZnTe pay a higher attention in photovoltaic applications, biological and gas sensors, photoelectronic devices, etc. Owing to its optical band gap (~3,7 eV for ZnS, ~2,7 eV for ZnSe, ~2,3 eV for ZnTe) these compounds may be used as a window layers in tandem solar cells, light-emitting diodes, etc.

II-VI semiconductor films were deposited onto glass (Raman investigations) substrates and ITO (indium tin oxide) substrates with conduction sub-layer (molybdenum, chrome, ITO) (investigations of electro-physical properties) in vacuum equipment VUP-5M at a residual pressure of $\sim 5 \cdot 10^{-3}$ Pa. Temperature conditions were: evaporate temperature - T_e = 1073 K (ZnSe); 1273 K (ZnS); 973 K (ZnTe), substrate temperature was varied in the range of T_s = (373 – 673) K, evaporation time was t = 1-3 min (Raman investigations), 10 min (electro-physical investigations).

Raman spectroscopy investigations were performed on spectrometer TRIAX 320 (1200 grooves) by using a He-Ne line-focused laser with wavelength of 441,6 nm and power of 50 mW at room temperature (297 K). Exposure was 5 sec., acquisition – 20 sec.

For investigation of electro-physical properties were measured dark current-voltage characteristics (*I-V* curves) of sandwich-structures. Furthermore, σ-*T* dependencies were investigated on ohmic, in some cases – on quadrant areas of *I-V* characteristics.

As a result of Raman investigations, we interpreted the series of some peaks due to the so-called longitudinal optical LO-phonon replicas in condensates. The replicas are better resolved at excitation conditions close to resonance Raman scattering conditions.

As a result of electro-physical investigations, *I-V* curves have a view of multilayer structures ITO-semiconductor-metal are determined by chalcogenide films condensation conditions, by their crystalline structure and by the material of cup- and bottom current-conduction contacts.