**Control of the forbidden gap width by varying the composition or the thickness of the layers of IV–VI semiconductors.** / A. M. Pashaev, O. I. Davarashvili, M. I. Enukashvili, Z. G. Akhvlediani, L. P. Bychkova, V. P. Zlomanov. / Nano Studies. – 2015. – # 12. – pp. 99-104. – eng.

The paper deals with investigation of the lattice constants of solid solutions $Pb_{1-x}Sn_xTe$ and $PbS_{1-x}Se_x$ and strained semiconductors PbTe and PbSe, and of their optical transmission spectra. The objective of the investigation is to reveal possible spectral overlap of the forbidden gap width in the layers of solid solutions of different compositions and of strained semiconductors. By the lattice constants, compositions $x$ of solid solutions and deformation in strained layers were determined. The forbidden gap width of the layers under study was determined by straightening the squared absorption coefficients obtained by the analysis of transmission spectra. It is shown, that with compression of the PbTe layers 60 nm in thickness grown on $BaF_2$ substrates, at $T = 300$ K the forbidden gap width coincides with that for the solid solution $Pb_{1-x}Sn_xTe$ of composition $x = 0.11$. For the PbSe layer 66 nm thick grown on the KCl substrate, with tension of the layer, the forbidden gap width exceeds, that for the PbS layer. If we grow the strained PbS layers with tension on substrates $BaF_2$ or KCl, and the PbTe layer on the BaTe substrate, it will be possible to overlap the spectral region from 1 to 3 μm in the strained layers. At the same time, if we grow solid solutions $Pb_{1-x}Sn_xTe$ of different compositions on the $BaF_2$ substrate with compression of the layer, it is possible to progress along the spectrum to the region 7 – 11 μm. These spectral regions are important for studying the absorption of molecular gases such as CO, $CO_2$, $SO_2$, $CH_4$, $HNO_3$, $N_2O$, and others. Fig. 2, Tab. 2, Ref. 6.

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