

Features of formation a buried lead-silicate layer in crystalline silicon

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The process of ion-beam synthesis of "silicon-on-insulator" structures, based on two-stage implantation, first of oxygen ions, then of lead ions as a glass former, was studied. Using the methods of secondary ion mass spectrometry and Auger spectroscopy, the phase transformations occurring in the synthesized hidden layer during post-implantation annealing were analyzed. It was found that with the onset of heat treatment, a rapid spinodal decomposition of the $\text{SiO}_x\text{-PbO}_x$ solid solution formed at the stage of implantation occurs. Then the process of slow relaxation begins against the background of "ascending" diffusion of lead atoms. In this case, the hidden layer of the insulator is compacted and leveled in thickness. Ultimately, it is formed in the form of a three-layer structure, its middle part is silicon oxide doped with lead, the side parts consist of a lead-silicate phase.

Keywords: silicon-on-insulator structures, ion-beam synthesis, insulator buried layer, spinodal decomposition, layer-by-layer distribution of components.

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