



OBTAINING II-VI COMPOUNDS AND SOLID SOLUTIONS SUBSTRATES FOR NANOPOROUS STRUCTURES

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ABSTRACT

The wide band-gap semiconductor II-VI compounds and solid solution have large perspectives to be utilized in optoelectronics (as active or passive medium), solar cells (as substrates and thin films) and spintronics. As you may know, substrates also are widely used in fabrication of nanoporous or nanowires (nanotubes) of various materials with exact diameter and length. The easiest and cost-effective method of obtain nanoporous structure is anodic etching. At the same time, implementation of anodic etching on the semiconductor II-VI compounds does not bring good results. Also, II-VI compound and solid solution substrate with nanoporous structure improves solar cells efficiency with reduction of light absorbance and thickness of the cell. The zinc oxide (ZnO) is one of the wide band-gap semiconductors II-VI compounds which is widely utilized for photovoltaic conversion, because it is transparent in visible and near- and mid-infrared spectral range. However, it is very difficult to get a single crystal of the zinc oxide with defined electrical parameters and resistant to the chemical etching.

This paper describes how to obtain not only ZnO single crystals, but also zinc selenide (ZnSe) and solid solutions (SS) at their base. We have already analyzed two possible methods of growth: physical and chemical vapour transport in sealed ampoule. We investigated different transport agents for chemical vapour transport method. All substrates were grown from self obtained seeds and then they were increased in their size. As a result, we obtained ZnSe substrate with nanoporous structure where medium diameter of porous is from 400 to 40nm and defined length. Also, we obtained ZnCdS solid solution substrate with nanoporous structure with porous diameter – 30 nm and wall thickness – 20 nm. Other II-VI single crystal compounds or solid solutions can not be utilized in obtaining perfect and exact parameters of nanoporous structure.

Keywords: zinc oxide (ZnO), zinc selenide (ZnSe), solid solution, anodic etching, nanoporous structure