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CFA LECTURES

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Comparative characterization of technology for ZnSe crystal growth

- Abstract -

ZnSe crystals are well known material for IR optical applications. For now three methods are used for crystals obtaining: chemical vapour deposition (CVD), physical vapour transport method (PVT), growth from melt (Bridgeman method). Each one method contains as advantages so flaws. CVD allows to obtain large size polycrystalline crystals hundreds cm diameter and less than 10 cm height. PVT method allows to obtain high quality single crystals, but deposition rate is too low. This method is used for experimental growth usually. The compromise between quality and manufacturability is a growth from melt. Obtained by Bridgeman method ingots contains large size single crystalline blocks and acceptable optical and structural quality. For growth from melt is necessary to take into account some technological difficulties: composition dissociation at temperatures lower than melting point, different vapour pressure of composition components, high temperature phase transition. Such peculiarities can lead to negative results: distortion of a melt stoichiometry, significant material evaporation during growth process, appearing a structure defects like "twins". In the Institute for Single Crystals NAS of Ukraine the growth technology of ZnSe crystals with an optical quality for laser applications was developed. Current properties of ZnSe crystals, grown by Bridgeman method will be discussed.

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