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MECHANISM OF NANO-CONE FORMATION ON CDZNTE CRYSTAL BY LASER RADITION

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Since crystalline $Cd_{1-x}Zn_xTe$ is widely used in the radiation techniques for the production of the detectors of X-ray, γ-ray, and other kind of hard radiation. The present work is a further study of processes occurring near the surface of $Cd_{1-x}Zn_xTe$ under laser radiation.

On the surface of the semiconductor crystal cone like nanostructure was formed after irradiation by second harmonic of Nd:YAG laser with intensity up to I ≈ 4 MW/cm^2. The scheme of model explaining nanostructure formation of the surface of $Cd_{1-x}Zn_xTe$ (x=0.1) is shown on fig.1. The main role in the initiation of this process has thermogradient effect (TGE) [1]. Two layers are formed near the irradiated surface of semiconductor: the top layer consists of mostly CdTe crystal but the underlying layer – ZnTe crystal. A mismatch of lattices of CdTe and ZnTe crystals is equal up to 5.8% [2]. This plastically deformation of the top layer leads to creation of nanostructures of the irradiated surface (fig.1) according to the modified Stransky-Krastanov model.

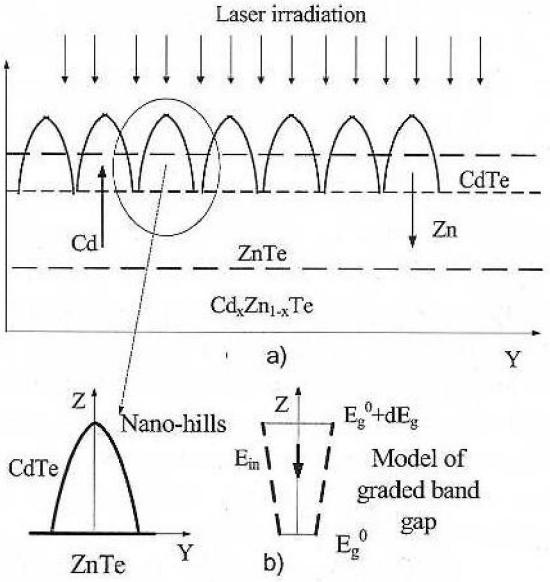

Fig.1. Model of nanostructure formation: a) cross-section of irradiated crystal; b) change of band gap in nano-hills.

References:

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2. *Physicochemical properties of semiconductor materials*, (Academic press, Moscow, 1979.