Accepted Manuscript

Structure, phase composition, and some properties of melt grown GaSe:Er crystals

E.B. Borisenko, A.V. Timonina, D.N. Borisenko, V.I. Nikolaichik, A.N. Tereshchenko, N.N. Kolesnikov

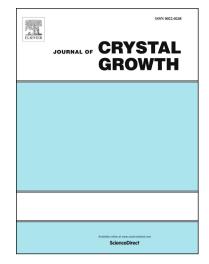
PII: S0022-0248(18)30251-3

DOI: https://doi.org/10.1016/j.jcrysgro.2018.05.024

Reference: CRYS 24612

To appear in: Journal of Crystal Growth

Received Date: 27 February 2018 Revised Date: 18 May 2018 Accepted Date: 22 May 2018



Please cite this article as: E.B. Borisenko, A.V. Timonina, D.N. Borisenko, V.I. Nikolaichik, A.N. Tereshchenko, N.N. Kolesnikov, Structure, phase composition, and some properties of melt grown GaSe:Er crystals, *Journal of Crystal Growth* (2018), doi: https://doi.org/10.1016/j.jcrysgro.2018.05.024

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Structure, phase composition, and some properties of melt grown GaSe:Er crystals

E. B. Borisenko₁*, A. V. Timonina₁, D. N. Borisenko₁, V. I. Nikolaichik₂,

A. N. Tereshchenko₁, N. N. Kolesnikov₁

1 Institute of Solid State Physics of the Russian Academy of Sciences, Akademika Osipýana str.,

2, Chernogolovka, Moscow region, 142432, Russia,

₂Institute of Microelectronics Technology and High Purity Materials of the Russian Academy of Sciences, Akademika Osipýana str., 6, Chernogolovka, Moscow region, 142432, Russia

Abstract

Powder and polycrystals synthesized from Ga, Se, Er components, as well as GaSe and GaSe:Er single crystals grown from melt in argon atmosphere and in vacuum, respectively, are studied. The growth and quenching conditions used in this work provide 2.5 times increase in solubility of erbium in GaSe matrix and a decrease in number of phases to GaSe and Er_2Se_3 , oppositely to multiphase GaSe:Er alloys known from literature. For the first time Er_2Se_3 phase was detected by XRD in GaSe crystal doped with 1 at%Er. Possible orientation relations are derived for $Er_2Se_3/GaSe$ epitaxial pair. It has been shown that stretched reflections in electron micro diffraction patterns and scattering of maximums in x-ray diffraction patterns are bound to stacking faults, which appear owing to thin interlayers of δ -GaSe polytype in ϵ -GaSe matrix of the melt-grown crystals. Morphology of growing crystal surface is studied. Photoluminescence spectra of pure and erbium-doped GaSe display intense photoluminescence bands, which are, presumably, associated with defect states in band gap of GaSe. It is shown that doping with Er has a strong effect on photoluminescence intensity and on its spectral composition. The measured 1.7 times increase in Vickers microhardness (up to 400 MPa) with respect to pure GaSe is due to solid solution hardening and to precipitation.

.

^{*} corresponding author, e-mail: borisenk@issp.ac.ru

Download English Version:

https://daneshyari.com/en/article/8148385

Download Persian Version:

https://daneshyari.com/article/8148385

Daneshyari.com