THE OPTOELECTONIC PROPERTIES OF $Sb_2(Se_{1-x}, S_x)_3$ (x= 0 - 1) SOLID SOLUTIONS

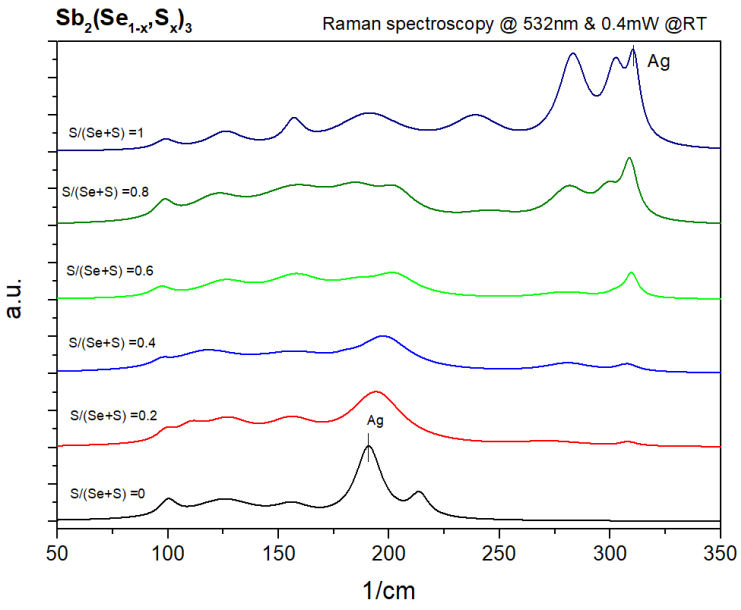
Mehmet Ender USLU[1] (presenting author), Olga Volobujeva[1], Kristi Timmo[1], Maarja Grossberg[1]

[1]*Department of Material and Environmental Technology, Tallinn University of Technology, Ehitajate tee 5, 12616 Tallinn, Estonia*

e-mail of presenting author: meuslu@taltech.ee

This study presents detailed analysis of the optoelectronic properties of the $Sb_2(Se_{1-x},S_x)_3$ (x=0-1) polycrystals studied by photoluminescence (PL) spectroscopy. Temperature and excitation power dependent PL analysis of $Sb_2(Se_{1-x},S_x)_3$ polycrystals was performed in order to reveal the dominating radiative recombination mechanisms and related defects in the study.

Six different antimony selenide-sulfide solid solutions $Sb_2(Se_{1-x},S_x)_3$ were synthesized at the same conditions, only varying the S/Se elemental ratio with step of 0.2. The polycrystals were synthesized in degassed and sealed quartz ampoules at T = 500ºC. The stoichiometric composition of the polycrystals was determined by Energy Dispersive X-ray spectroscopy (EDX). Accroding to Raman spectroscopy and X-ray Diffraction (XRD), the polycrystals were free from secondary phases. As expected for the same crystal structure of Sb_2Se_3 and Sb_2S_3, the bimodal behavior of the main A_g Raman mode is detected.



The shift of the PL emission towards higher energies with increasing sulfur content was observed. Temperature dependent PL revealed also changes in the radiative recombination mechanisms with changing S/Se ratio. This will be discussed further in the presentation.

Euroopa Liit
Euroopa
Regionaalarengu Fond

Eesti
tuleviku heaks

This work was supported by European Union through the European Regional Development Fund, Project TK141, and by the Estonian Research Council grant PRG1023.