STUDIES OF NOVEL LOW COST ABSORBERS CUSBS2 AND CUSBSE2 FOR SOLAR CELLS

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The aim of this work was to synthesize high quality photovoltaic absorber materials $CuSbS_2$ and $CuSbSe_2$ in the form of polycrystalline powders and to analyse their structural and optoelectronic properties depending on the synthesis conditions. Different precursor materials were used including binaries Cu_2S/Cu_2Se and Sb_2S_3/Sb_2Se_3, or elementary Cu, Sb, and S/Se that were ground, mixed and sealed into quartz ampoules. The synthesis temperature was varied in the range from 450^0C to 900^0C. It is known from literature that the melting point for $CuSbS_2$ is 551^0C [1] and for $CuSbSe_2$ 490^0C [2]. Synthesis conditions for the formation of single phase $CuSbS_2$ and $CuSbSe_2$ were determined.

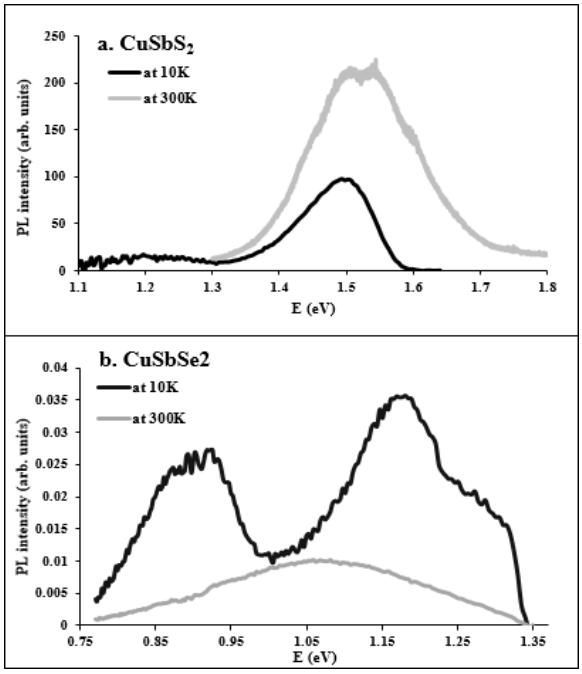

Fig.1 PL spectra of $CuSbS_2$ and $CuSbSe_2$ at different temperatures.

The synthesized powders were investigated using Raman scattering, X-ray diffraction, Energy Dispersive Spectroscopy and temperature dependent photoluminescence spectroscopy (PL).

It was found that the low-temperature (T=10K) PL spectra of both, $CuSbS_2$ and $CuSbSe_2$, consist of two emission bands - edge emission and deep PL emission. Temperature and laser power dependent PL measurements were performed to determine the dominating radiative recombination mechanisms in the studied materials.

References

1. B.Yang, L.Wang, J.Han, Y.Zhou, H.Song,, S.Chen, J.Zhong, 2014, *Chem. Mater.,* 26 (10), pp 3135–3143
2. B.Korzun, V.Sobol, M.Rusu, R.Savizky, 2016, *Mater. Res. Soc. Symp. Proc. Vol. 1735*

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