



SYNTHESIS AND SURFACE ANALYSIS OF $\text{Cu}_2\text{Zn}_{1-x}\text{Cd}_x\text{SnS}_4$ ABSORBER MATERIAL FOR MONOGRAIN SOLAR CELL APPLICATIONS

G. Nkwusi, I. Leinemann, M. Altosaar, D. Meissner, R. Traksmaa

*Tallinn University of Technology
Ehitajate str. 5, 19086 Tallinn – Estonia*

ABSTRACT

CdI_2 has been proven as a low temperature flux material for the synthesis of $\text{Cu}_2\text{ZnSnS}_4$ (CZTS) absorber materials, used in monograin membrane solar cells, where each grain works as an individual solar cell. It means that the final solar cell performance depends strongly on homogeneity of absorber material powder. In the monograin technology, the isothermal recrystallization of semiconductor polycrystalline powders in the presence of the liquid phase of a suitable solvent (flux) material in sufficient amount, aids the formation of powders with single crystalline structure of powder grains. However, to reach single phase absorber material in monograin powder form, the problems of the presence of by-products need to be solved. Also the incorporation of Cd and I from CdI_2 into CZTS crystals affects the properties of solar cell absorber materials. CZTS powder samples were synthesized in CdI_2 as flux material. The obtained materials were analysed by EDX, SEM, XRD and Raman methods. The optimal Cd content and possible chemical treatments with the aim to remove off the by-products to reach the single phase absorber material are reported.

Key Words: CZTS, Monograin, flux material, EDX/SEM