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Eesti tuleviku heaks

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Effect of different flux materials on $\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$ monograin powders

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$\text{Cu}_2\text{ZnSn}(\text{S}_x\text{Se}_{1-x})_4$ (CZTSSe) monograin powders are promising solar cell materials due to direct bandgap and large absorption coefficient of material and cheap technology of production. CZTSSe monograin layer solar cells have a highest efficiency of 5,9 %.

CZTSSe monograin powders as absorber materials for monograin layer solar cells were prepared from binary compounds in the liquid phase of flux material in evacuated quartz ampoules. To study the effect of different flux materials to the properties of CZTSSe monograin powders KI, NaI, ZnI_2 and CdI_2 were used as a flux material. Energy dispersive spectroscopy and scanning electron microscopy studies revealed that flux material has a substantial effect on the crystal shape and composition. Monograins grown in NaI had rather round shape, but the use of KI or ZnI_2 flux resulted in grains with sharp edges. Raman spectra of CZTSSe powders showed an intensive peak at 330 cm^{-1} and additional peaks at $160\text{-}234\text{-}285\text{-}365\text{ cm}^{-1}$, which is characteristic to CZTSSe materials. The content of impurities in materials was analyzed by X-ray photoelectron spectroscopy.

Powders were used as an absorber material in monograin layer solar cell structures: ZnO/CdS/CZTS/graphite and were characterized by current-voltage measurements.