



**Euroopa Liit
Euroopa Sotsiaalfond**



Eesti tuleviku heaks

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Sulfur-containing $\text{Cu}_2\text{ZnSnSe}_4$ monograin powders for solar cells

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$\text{Cu}_2\text{ZnSn}(\text{Se}_{1-x}\text{S}_x)_4$ (CZTS) monograin powders with different x values were prepared from binary compounds in the liquid phase of flux material (KI) in evacuated quartz ampoules. Monograin powders were characterized by EDS, SEM and XRD. The materials' crystals had uniform elemental composition and p -type conductivity. The prepared monograin powders were used as absorber material in monograin layer (MGL) solar cell structures: ZnO/CdS/CZTS/graphite, where every crystal works as individual solar cell. Quantum efficiency measurements of solar cells on the base of sulfur containing materials revealed remarkable shift to lower wavelength side with increasing sulfur content. Solar cells showed uniform parameters over the whole working area of $1 \times 1.5 \text{ cm}^2$. The best values of solar cell parameters based on $\text{Cu}_2\text{ZnSn}(\text{Se}_{1-x}\text{S}_x)_4$ monograins were: open circuit voltage 670 mV, short circuit current 15 mA/cm^2 and fill factor 63%.