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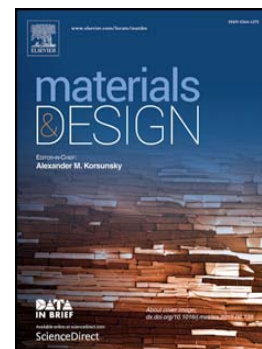
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Phase-selective and photoactivity investigation of solvothermal synthesized**Cu₂ZnSnS₄ nanoparticles**

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Abstract: Cu₂ZnSnS₄ (CZTS) nanoparticles with bandgap of about 1.5 eV were synthesized by a simple solvothermal method with oleylamine (OAm) and ethanediamine (En) as the reaction solvents. Raman spectra and X-ray photoelectron spectroscopy examined the phase purities of CZTS nanoparticles. Kesterite structured CZTS were gradually changed into the wurtzite structured CZTS by varying the volume ratios of OAm and En, which was confirmed by X-ray diffraction measurements. Time-dependent experiments were performed to study the mechanism of the phase selection of CZTS, which indicated that En played an important role in the formation of wurtzite structured CZTS. Annealing process improved the crystallinities of CZTS nanoparticle thin films, but wurtzite structured CZTS was changed to more stable kesterite phase. Photo-electrochemical measurement indicated that wurtzite structured CZTS nanoparticle thin films had better photoelectric properties.

Keywords: Cu₂ZnSnS₄, Nanoparticles, Wurtzite, Solvothermal, Solar cells

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