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Syntheses and characterization of copper chalcogenide nanoparticles and their use in solution processed photovoltaics

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Abstract :

Photovoltaics based on semiconductor nanoparticles are said to surpass the working efficiency of traditional silicon cells while also reducing the production costs This can be attributed to their intrinsic properties. that arise from the quantum confinement effect as well as their processability. Properties of copper selenide have been intensively used as a primary reference for CIS and CIGS solar cells. Herein we report on the synthesis of copper selenide quantum dots (QDs) using a “one pot” colloidal method for application in photovoltaics. The effect of temperature, time and concentration on the properties of the nanocrystals was subsequently studied. Copper selenide quantum dots have been synthesized and characterized on UV-Vis and TEM amongst other techniques. Results generally show that temperature, time of synthesis and concentration of precursors affect the yield and size of QDs. The synthesized quantum dots were found in hexagonal structure with the average diameter around 4.5 nm which confirmed the large blue shift observed. The positive impact of synthesized copper selenide quantum dots as well as their ternary and quaternary compounds in photovoltaic applications is proven.

Award :

yes

Level :

PhD

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Paper :

Yes

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