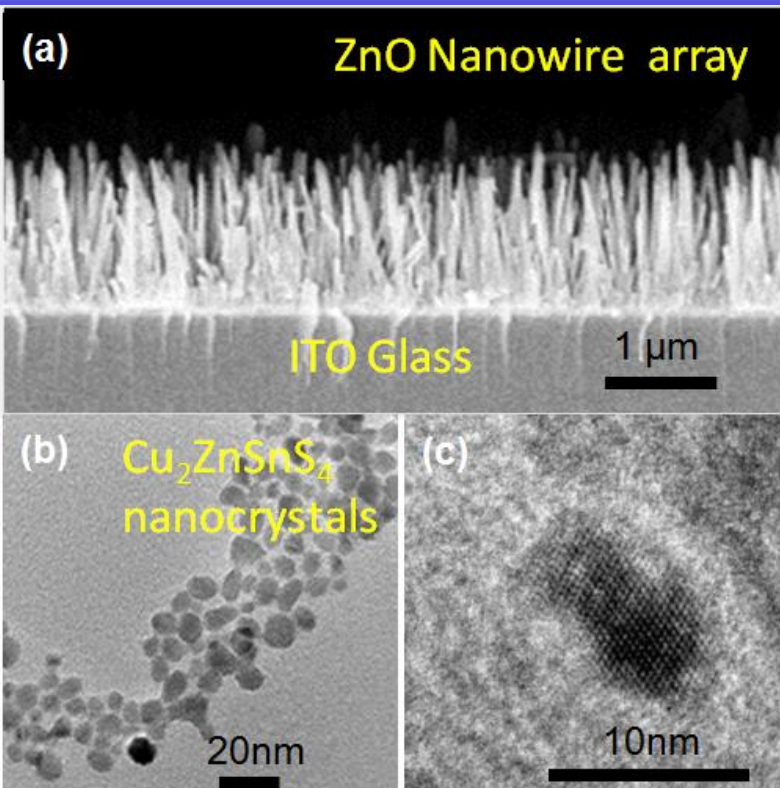


# Synthesis of $\text{Cu}_2\text{ZnSnS}_4$ nanocrystals and ZnO nanowire array for low cost solar cells fabrication

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## Background & Motivation

$\text{Cu}_2\text{ZnSnS}_4$  (CZTS) has attracted vast attention as an ideal absorption material in solar cell owing to its high absorption coefficient, direct band gap of 1.4~1.5 eV and abundance in earth's crust. Herein, we focus on constructing an environmentally friendly and low cost solar cell by coupling nanocrystals with ZnO nanowires array. In this device prototype, the carrier separation and collection are facilitated by the radial  $p$ - $n$  junction embedded in the nanowire and nanocrystals.



## Progress

A large area of aligned ZnO nanowires array was synthesized by hydrothermal method on an ITO substrate, which exhibits tapered morphologies and diameters in the range of 80~180 nm. CZTS nanocrystals were synthesized by wet chemistry method, exhibiting a size in the range of 7~15 nm. The influence of different parameters on the size and morphologies was investigated. Structure analysis of nanocrystals, including X-Ray diffraction, transmission microscopy and Raman spectrum, were carried out and the composition and crystal structure were verified. Preliminary photovoltaic devices consisting of ZnO nanowire array and CZTS nanocrystals were fabricated.

## Plans

The fabrication of the device is still in process. The further modification of the nanowire morphologies on the properties is needed. The assembly of CZTS nanoparticles will be studied.