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Oleylamine-assisted solvothermal synthesis of copper antimony sulfide nanocrystals: morphology and phase control

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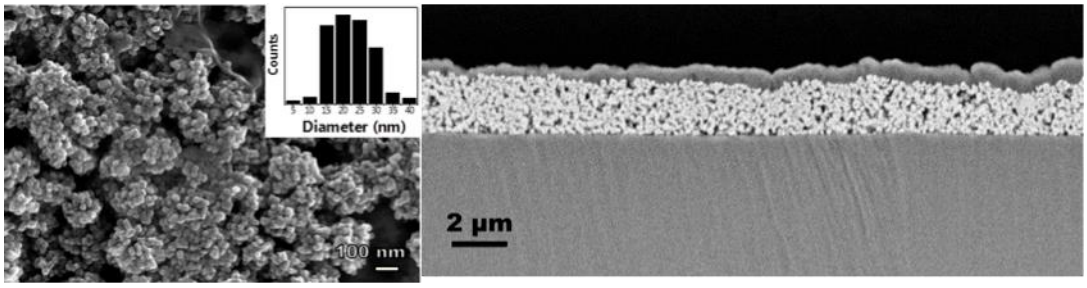
Graphical abstract



Highlights

- Famatinite nanoparticles have been synthesized
- Solvothermal synthesis methods have been used
- Nanocrystal morphology has been characterized
- A colloidal suspension has been formulated to fabricate films
- Films have been electrically and optically characterized

We report a one-pot synthesis of copper antimony sulfide nanocrystals by a facile and easily scalable route using a surfactant assisted solvothermal method. Phase-pure and quasi-monodisperse Cu_3SbS_4 nanocrystals have successfully been synthetized by adjusting the sulfur to copper molar ratio as well as the surfactant to solvent volumetric ratio. Nanocrystals morphology and chemical composition are characterized. As synthetized and purified nanocrystals are formulated into a colloidal suspension in order to fabricate copper antimony sulfide films. Morphological, electrical and optical characterizations of famatinite films are conducted. The electrical resistivity of the as deposited films