EFFECT OF NON-PHOSPHINE SOLVENTS ON THE STRUCTURE and MORPHOLOGY OF THE Cu2SnSe3 (CTSe) NANOPARTICLES SYNTHESIZED BY HOT-INJECTION METHOD
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Synthesis of copper tin selenide (Cu2SnSe3) nanoparticles was performed using hot-injection method under nitrogen atmosphere. Non-phosphine solvents such as oleylamine (OLAM), oleic acid (OLA), 1-octadecene (1-ODE) were used for the synthesis of the nanoparticles. The synthesis was carried out using different mixture of these solvents like pure OLAM, OLAM/OLA/1-ODE, OLAM/OLA and pure OLA at the temperature of 230°C. Powder X-ray diffraction (XRD) results reveal that the synthesized nanoparticles evolve with cubic structure. Optical band gap of the synthesized nanoparticles were measured from UV-Visible absorption results. Scanning electron microscopy (SEM) analysis of the particles indicate that the prepared nanoparticles exhibited different morphologies due to the solvent effect. Transmission electron microscopy (TEM) and Attenuated Fourier transform infra-red (AT-FTIR) analysis were carried out to understand the size and presence of organic ligands attached on the surface of the nanoparticles. The mechanism involved in the influence of solvents on the morphological properties was discussed in detail.

Figure 1: (a, b) HRTEM images of the synthesized Cu2SnSe3 nanoparticles and (c) EDX spectrum of the Cu2SnSe3 nanoparticles