

**Synthesis and characterization of castor oil and ricin oleic acid capped metal sulfide  
Semiconductor nanoparticles using heterocyclic metal dithiocarbamate complexes  
as single source precursors**

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The synthesis and characterization of CdS and PbS semiconductor nanoparticles capped with green renewable materials; castor oil and ricin oleic acid is reported. The materials were synthesized from thermal decomposition of their corresponding piperidine and tetrahydroquinoline metal dithiocarbamate complexes as single source precursors. Different reaction parameters such as time, temperature and the type of dispersing solvent were varied to obtain particles with different properties and morphology. The complexes were thermolyzed at temperatures varying from 190 °C to 300 °C in castor oil and ricin oleic acid. To assess the influence of using greener dispersing solvents on the properties of the resultant particles, Tri-n-octylphosphine (TOP) was also employed in the synthesis. All particles were found to be in the nanosize regime as determined from TEM and XRD analyses. The UV-Vis spectra of the synthesized materials showed a blue shift relative to the peak absorptions of their bulk counterparts indicating quantum confinement effects and hence the synthesis of nanometric materials. Photoluminescence spectra of CdS nanoparticles also revealed quantum confined relatively broad emission peaks. Time did not seem to have an effect on the properties of the synthesized materials as little/no changes were observed in the materials produced after 30 minutes, 1 hr. and 2 hrs. of the reaction time in both cases. The effect of temperature, type of capping material, dispersing solvent and complex used was however significant. Oval-short rods and spherical shaped CdS nanoparticles with average sizes ranging from 10 to 22 nm were obtained. Dendritic, multi-branched, spherical, and cubic and rod shaped PbS nanoparticles with various sizes were obtained. IR analysis confirmed that all synthesized materials were successfully capped by castor oil and ricin oleic acid.