

Aerosol Flow Synthesis and Stabilization of CdSe Nanocrystals

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We report on the preparation and structural characterization of CdSe nanocrystals, which are synthesized via a continuous ultrasonic assisted aerosol flow system. The precursor solution is ultrasonically nebulized into microdroplets, which is aerosol created using an ultrasonic transducer, and the dense mist so produced is carried by an Ar gas flow into a heated tube furnace where solvent evaporation and precursor reaction occurs, producing a CdSe nanocrystals. Because as-prepared CdSe nanocrystals are unpassivated with ligands, the surface passivation of CdSe nanocrystals is necessary to enhance the stability, which is conducted by reflux with stabilizing agent for overnight. This aerosol assisted continuous synthetic method provides an opportunity for the study of structural characterization, which is executed by controlling the heating temperature, residence time, and precursor concentration, and the evolution of optical properties, light absorption and emission. The mechanisms of nucleation and crystal growth are proposed and discussed in detail.