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# Synthesis Methods of Cds Nanoparticles and Thin Films

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**ABSTRACT:**

Nanocrystalline semiconductor materials have been extensively investigated during the last decade, due to their unique properties which are not present in bulk materials. Among all semiconductor materials, Cadmium sulfide is an important II-VI semiconductor material, with wide band gap energy. Here we are discussing different existing routes like chemical, biological by which CdS nanoparticles, nanocrystals and thin film can be synthesized. The synthesis of highly mono dispersed CdS nanocrystals via size restricting growth modes.

**KEY WORDS:** Electrochemical Analysis,-Teflon liner autoclave–absolute ethanol–Chemical doping of $CdCl_2$–nano dispersion–cello phane membrane–band gap of $CdCl_2$.

## INTRODUCTION

The nanoparticles of CdS have been synthesized by various routes including ionic [1], and electro chemical reaction [2], solvothermal routes [3] and reverse micelles [4]. In recent years, preparation of various low dimensional CdS nanostructures such as nanoparticles, nanowires, nanorods and nanotubes has been intensively studied by using a wide range of synthesis methods [5].

(1). 0.5mM Sodium thiosulfate pent hydrate ($Na_2S_2O_3$ . $5H_2O$, AR) and 0.5 mM cadmium chloride ($CdCl_2$ . $2.5H_2O$, AR) were dissolved in 40 ml distilled water under continuously stirring for 15 min, then certain dosage of poly (N-Vinyl–2–Pyrrolidone) was introduces into solution . The solution and 40 ml distilled water were transferred into Teflon liner autoclave with 80 ml capacity. The autoclave was sealed and maintained at certain temperature for special time, then cooled naturally to 300K. Finally, the precipitates were dispersed in absolute ethanol [6].

(2). Thiophenol ($5.75x\ 10^{-2}$ M) and a methanolic solution (50 ml) of $cd^{+2}$ ions ($2.34x10^{-2}$ M) were prepared. In this solution, 0.5ml alcoholic KOH solution (0.1M) was added and Ar was bubbled through the solution to remove dissolved

oxygen A saturated methanolic solution of $Na_2s$ was added to make the final molar ratio of $Cd^{+2}$ : thiophenol : $S^{-2}$ 1: 2.5:0.5. Sodium sulfide ($Na_2S$) and $CdCL_2$ were used as starting materials. The solution thus obtained was centrifuged and precipitate was washed in methanol for 3-5 times [7].

(3) Prepare a mixture of $5x10^{-3}$ M solution of $Na_2s$ to the joint solution of $CdCL_2$ (= 5 x $10^{-3}$M) and pyridine (=$5x10^{-3}$ M) under stirring at constant temperature. From this formula, synthesis of CdS nanoparticles is obtained .A mixture of $CdCL_2$-pyridine solution possesses the necessary quantity of $Incl_3$. Here chemical doping of CdS with $In^{+3}$ (in fact with $In_2S_3$). The definite quantity of $Na_2S$ solution was added to above prepared solution to keep stoichiometric ratio of the elements and 10% or 20% weight loading of $In_2S_3$ in the CdS nanoparticles. In order to obtain the complete the nanoparticles formation, this mixture should be kept in dark for 36 hours. Then light yellow CdS nanodispersoins were dialyzed against 0.05M water solution of pyridine through cellophane membrane [8].

**RESULT:**

CdS has larger stability, easy preparation and distinct band gap. So CdS is well-studied semiconductor. We can find out number of optical phenomena because it has distinct band gap [9]. CdS exhibits interesting nonlinear optical and luminescence properties [10]. If one decrease particle size of CdS nano particles. Then both absorbance and band gap increases.

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