A variety of binary semi conductors especially from II to VI group of the periodic table have been studied extensively due to their potential use in photo conductive devices and solar cells \[7-8\]. In recent past much importance has been given in the field of II-VI class of semi conducting compounds because of their opto-electronic properties and applications. CdS is one of the most interesting II-VI semiconductors owing to its interesting optical, electrical and optoelectronic properties and applications. CdS is one of the most interesting II-VI semi conductors owing to its interesting optical, electrical and optoelectrical properties. Possessing a wide fundamental band gap, they have been used in a large variety of applications such as electronic and optoelectronic devices. Some applications of CdS thing films including photo detectors, piezoelectric transducers, solar cells, etc. have been reported in the 1960s-1990s \[9\].

It has been studied that the influence of ammonia concentration on stoichiometric, surface morphological and optical properties of chemical bath deposited cadmium sulphide thin films \[9\]. They deposited CdS thin films using Chemical bath deposition (CBD) by taking cadmium acetate as the cadmium ion source, thiourea as the sulphur source and ammonia as the complexing agent. The films deposited with ammonia concentration of 1.0 M show the highest degree of crystallinity and closest stoichiometry Cd/S = 1, and have a preferred orientation. The direct band energy gaps of as-grown films were found to be 2.23-2.77eV. The formation mechanism of the films with various morphologies and cadmium and sulphur deficiencies are discussed well based on the SEM, XRD, and EDXS measurement results. Researchers have deposited binary CdS thin film by modified
CBD method at room temperature \cite{10}. X-rays analysis showed that CdS film sample exhibit in the cubic modification. The optical analysis shows that there is direct type of transition and band gap was found to be in the order of 2.4 eV. He also confirmed the n-type conductivity of CdS thin films by TEP measurement.

Researchers studied photo electrochemical (PEC) properties of Cadmium sulfide thin films deposited on glass substrate by simple and cost effective CBD technique. Triethanolamine was used as a complexing agent. The preparative parameters like ion concentration, temperature, pH, speed of substrate rotation and deposition time have been optimized for good quality thin films. The ‘as-grown’ films are characterized for structural, electrical, optical and photo electrochemical (PEC) properties. The X-ray diffraction (XRD) studies reveal that the films are polycrystalline in nature. Energy-dispersive analysis by X-ray (EDAX) shows that films are cadmium rich. The photo electrochemical (PEC) cell with CdS thin film as a photoanode and sulfide/polysulfide (1M) solution as an electrolyte have been constructed and investigated for various cell parameters \cite{11}.

Researchers \cite{12} prepared the CdS films with chemical pyrolysis deposition (CPD) at different temperature followed by annealing. The results of microanalyses CdS films deposited at 400-450°C were poly-crystalline with wurzite phase structure, and its lattice constants are: a= 4.135 and C=6.713 Å. They also observed that the electrical properties of CdS films can be improved by annealing at a certain temperature range if these films are used as optical windows for solar cell.
Authors [13] studied the cadmium sulfide (CdS) thin-films deposited on glass substrate by using chemical bath deposition (CBD) and vacuum evaporation (VE) techniques. They found that VE-CdS films consisted primarily of hexagonal phase, whereas CBD CdS films containing primarily the cubic form. VE-grown films were shown to have better crystallinity than CBD- grown films. The grain size of the CBD films is smaller than the ones of VE films. VE-CdS films exhibited relatively high transmittance in the above-gap region and band gap compared with CBD films.

Authors [14] found that the photo degradation efficiency of CdS was enhanced by facile calcinations treatment. The optimal calcinations time in air and O₂ atmosphere was 45 min. and 30 min. respectively. Correspondingly, the efficiencies were improved by 87.5% and 69.7%.

The photo electrical properties of CdS thin film deposited by electrodeposition using aqueous solution bath on stainless steel and FTO substrate were studied by researches [15]. The Cds thin film deposited on stainless steel substrate annealed in nitrogen atmosphere shows excellent photovoltaic activity as compared to that deposited on FTO.

Researchers [16] studied the thin CdS film deposited by electron beam evaporation; the substrate temperature was varied in the range of 30-250°C. X-ray diffraction studies indicated polycrystalline hexagonal structure. They found that photo conductive cells fabricated with the doped and undoped films have exhibited high photosensitivity and high signal to noise ratio and linear I-V characteristic.
Cadmium Selenide is a popular semiconducting material from the II-IV group. Cadmium selenide (CdSe) in thin film form is a direct band gap material because of which it is very useful in the optoelectronics. CdSe is an important class of semiconductor material, which finds applications in low cost devices such as light emitting diodes, solar cells, photo detectors, electro-photography, lasers, gas sensors, thin film transistor and gamma ray detectors. Researchers [17] studied the influence of annealing in nitrogen atmosphere on the structure, optical and electrical properties of cadmium selenide (CdSe) thin films deposited by chemical bath deposition (CBD) onto glass substrates. They found that the as-deposited Cdse thin films grow in the nanocrystalline cubic phase with optical band gap 1.93 eV. Authors [18] studied the structural, optical and electrical properties of chemically deposited CdSe thin film. The X-ray diffraction analysis that the film samples are in cubic crystal structure and the optical band gap energy (Eg) was found to be 1.7 eV.

Researchers [19] prepared cadmium selenide (CdSe) thin films on glass substrates at different substrate temperatures by spray pyrolysis. Aqueous solutions containing precursor’s Cd and Se have been used to obtain to good quality films. Nearly stoichiometric films with better structural, compositional, optical and electrical properties can be obtained at substrate temperature of 300°C. XRD studies reveal polycrystalline nature of the films with hexagonal crystal structure irrespective of substrate temperatures. Scanning electron microscopy studies reveal uniform deposition with the average grain size of 100 mm.

Researches [20] studied the variation of optical constants (n,K) with film thickness and substrate temperature thoroughly for vacuum-evaporated
polycrystalline CdSe films deposited on glass substrates. The effect of the nature of the substrates on the variation of optical band gap is studied for the films deposited on glass and mica substrates. Two direct transitions, one at about 1.67 eV and another at about 1.99 eV can be observed for the CdSe films deposited on mica substrates. Researchers [21] used chemical bath deposition method for the preparation of cadmium selenide (CdSe) thin films on a glass and mica substrates. Two direct transitions, one at about 1.67 eV and another at about 1.99 eV can be observed for the CdSe films deposited on mica substrates. Researchers [21] used chemical bath deposition method for the preparation of cadmium selenide (CdSe) thin films on a glass substrate at room temperature. They showed that the CdSe thin films deposited by an aqueous alkaline medium at room temperature grow with nanocrystalline cubic phase, with band gap 2.3 eV and electrical resistivity of the order of $10^6$ ohm cm. thermal annealing was found to increase the crystallites of films along with a recrystallization process that changes the metastable nanocrystalline cubic (zinc-blende type) phase of CdSe into the stable polycrystalline hexagonal (wurtzite type) phase. Due to air annealing, the crystallite size of particle increases from 45Å to 180 Å that result in a decrease in electrical resistivity. Authors [22] reported the deposition of polycrystalline films of CdTe and CdSe using electrodeposition method onto titanium substrates from acidic baths.

Authors [23] prepared porous CdSe layers by spray pyrolysis deposition using sodium selenosulfate as a selenium source and its surface area and porosity were increased by the dissolution of sodium sulfate forms as by product. They also showed that p-CdSe could act as both a photoanode and a sensitizer. Authors [24] used successive ionic layer adsorption and reaction (SILAR) method for the
preparation of CdSe thin films on glass substrate at room temperature and ambient pressure. They investigate the relationship between refractive index and energy band gap. They also investigate the film thickness effect on the structural, morphological, optical and electrical properties of CdSe thin films.

Authors [25] developed the chemical spray-deposition technique for the preparation of cadmium selenide thin films by using non-toxic selenosulfate as the selenium source. The substrate temperature was varied in the range form 300 to 500°C. XRD patterns indicated the presence of single-phase hexagonal CdSe. The resistivity of the as-deposited films was found to vary in the range 10-120 mΩ depending on the substrate temperature. A direct band gap of 1.65 eV was obtained from optical absorption and spectral response measurements.

Authors [26] used dip technique for the deposition of crystalline cadmium selenide thin film. The precursor solution contains cadmium sulphate, sodium selenosulphate with maleic acid as a complexing agent. The deposited films undergo various characterization techniques. The crystalline phase of the deposited sample was hexagonal wurtzite-type. Compositional study indicates ratio of Cd:Se was close to 1:1, the direct optical band gap energy was found to be 1.90 eV.

Researchers [27] synthesized CdSe thin by chemical bath deposition method on glass substrate. For the deposition of CdSe thin films they used cadmium chloride and sodium selenosulphate as source of Cd²⁺ and Se²⁻ ions respectively. While the malonic acid is used as a complexing agent in the synthesis of CdSe thin films. The X-ray diffraction analysis shows that the film samples are in cubic crystal structure. The optical band gap energy (Eg) was found to be 1.7 eV.
Researchers [28] reported the optimization of a program for CdSe thin film deposition using electro chemical atomic layer epitaxy (EC-ALE). X-ray diffraction indicated the deposits were zinc blende, with a (1 1 1) preferred orientation. The thickness of the deposits were determined using ellipsometry, and found to be around 70nm. Authors [29] discuss the influence of pH and the substrate on the chemical composition of the films, optical properties and their crystallinity. They prepare the cadmium selenide (CdSe) nanocrystalline thin films by electro deposition on titanium and indium tin oxide substrate in an electrolyte containing CdSO$_4$ and H$_2$SeO$_3$ at pH 2.50 and temperature 298 K. experimental results indicate that smooth, uniform surface, smaller grain sizes and larger absorption of CdSe film was obtained in pH 2.5 plating solution.

Authors [30] studied the effects of the indium doping on structural and optical properties of CdSe thin films deposited by laser ablation technique. Bandgap narrowing and band tails are observed in the absorption spectra when the ind concentration increases. Authors [31] studied the effect of air annealing on structural, optical, microscopic, electrical properties of cadmium selenide thin films deposited on glass substrate by using dip method. The optical properties showed direct band gap values were found to be in the region of 1.82-1.55 eV. The electrical studies show conductivities increases in annealing temperature. Authors [32] studied the influence of pH on micro-structural and optical properties of electro synthesized CdSe thin films. The optical energy gaps are found to be in the range from 1.87 to 2.04 eV depending on the pH of the depositing bath. Photoluminescence (PL) spectrum shows blue shift in PL peak position and reduction in luminescence intensity for the film deposited at pH other than 2.70.
Because of specific physical properties the binary semi conducting compounds belonging to the cadmium chalcogenide family, their mixed compounds can be advantageously used as thin polycrystalline films for various applications, in particular for the conversion of solar energy in photovoltaic or photo electrochemical devices. A solution growth process is used by the researchers \(^{[33]}\) for the deposition of CdSe\(_{1-x}\) Se\(_x\) thin film composites with 0<x<1. Cadmium acetate, thiourea and sodium selenosulphate were used as the basic source materials. The samples were obtained at 55\(^{0}\) in an alkaline medium and were characterized by optical and electrical characterization techniques. The layer thickness is found to be decreased as x is varied from 0 to 1. The absorption spectra of these composites showed a high coefficient of absorption with allowed direct type of optical transitions. Researchers \(^{[34]}\) studied CdS\(_{1-x}\) Se\(_x\) thin films deposited with different composition on amorphous glass substrate by spray pyrolysis techniques. The optical studies indicated that films exhibit direct band gap which is strongly depending on composition allowing tailoring of band gap as required for solar cell applications. The electrical conductivity CdSe\(_{1-x}\) Se\(_x\) thin films is found to increase with selenium concentration up to x = 0.8. Authors \(^{[35]}\) studied structural, optical and electrical properties of thin films of cadmium sulphoselenide (CdSSe) chemically deposited using cadmium salt, thiourea and sodium selenosulphate, covering total composition range from CdS to CdSe. They found that CdS films are cubic, while mixed CdSSe and CdSe films are hexagonal. The optical absorption studies showed that as Se content in CdS film increases, band gap, Eg decrease from 2.5 eV (CdS) to 1.8 eV (CdSe). The electrical resistivity of CdS in higher than that of mixed and CdSe films. Authors \(^{[36]}\) studied ternary alloyed CdSe\(_{1-x}\) Se\(_x\) thin films of variable composition ‘x’ were grown by the simple and economical chemical bath deposition technique. The as-grown thin
films were characterized for structural, compositional, surface morphological. Optical and electrical studies. They found potential application of CdSe\(_{1-x}\) Se\(_x\) thin films in various opto-electronic devices because of the wide and fine tenability of the band gap as well as the uneven changes in the resistivity. The researchers\(^{[37]}\) studied films of CdSe\(_{1-x}\) Se\(_x\) with different x values (\(0<x<1.0\)) deposited on glass substrates by co-evaporation CdS and CdSe using the two-zone hot wall technique. Films were highly resistive and polycrystalline in nature with partially depleted grains. Photoconductivity and dark conductivity of the films were measured in the temperature range 230-430 K.

The researchers\(^{[38]}\) discuss the CdSe\(_{1-x}\) Se\(_x\) thin films of various compositions deposited onto the amorphous and FTO coated glass substrate using a spray pyrolysis technique. An electrode/electrolyte interface has been formed between an n-type CdSe\(_{1-x}\) Se\(_x\) alloyed/mixed type semiconductor and sulhide/polysulphide redox electrocycle power output characteristics. They observed the significant electro thermal properties for a cell with electrode composition \(x = 0.8\).

Authors\(^{[39]}\) studied the effect of annealing on the chemically deposited CdSSe thin films. CdSSe thin films deposited by an aqueous alkaline medium at room temperature show band gap 3.22 eV which under annealing in hot plate was found to be 2.68 eV improved the crystallinity of films. Due to air annealing, the films shows a ‘redshift’ of 0.6 eV in the optical spectra. Due to good absorbance in different regions, they could be used to from p-n junction solar cells with other suitable thin film materials for photovoltaic generation of electricity and serve as good window layers for photocells.
Authors \cite{40} prepared sintered CdSe\textsubscript{1-x} Se\textsubscript{x} films in the entire composition range from CdSe to CdS using a Screen printing method. The band gap of these films is studied using reflection spectra in the wavelength range 350-900 nm and the structure of these films is studies XRD. The films have a direct band gap, which varies from 1.74 eV for CdSe to 2.44 eV for CdS films.

By reviewing the work of these researches, we have observed that main emphasis is on the structural, optical and electrical properties of CdSe\textsubscript{1-x} Se\textsubscript{x} semi conducting thin films for very few compositions. So here we are attempting to study the growth and characterization of CdSe\textsubscript{1-x} Se\textsubscript{x} thin films as a function of x.