Figure Captions

Chapter 1

Fig.1.1. (a) Schematic Diagram of a Typical Physical Vapour Deposition System.

(b) Source, (i) basket, (ii) helix.

Fig.1.2. Schematic diagram of an Electron beam Evaporation System

(a) Work accelerated gun.

(b) Bent beam electron gun.

A - LT Magnetic Focussing, F - Anode, H - Copper hearth, I - pole pieces, J - Water coated tube, K - permanent U-Magnet, L - Evaporant material.

Fig.1.3. Schematic diagram of an MBE System.

Fig.1.4. Schematic diagram of an ARE System.

A-Filament, E-Filament cover, F-Water cooled discharge chamber, D-Gas inlet, B-Anode, H-Magnets, S-Substrate, J-Substrate heater, C-Evaporator.

Fig.1.5. Schematic diagram of an Ion Plating System.

Fig.1.6. Principal regions in a low-pressure dc glow discharge.

Fig.1.7. Schematic arrangements for various Sputtering variants;

(a) Diode, (b) Triode and (c) Magnetron

A-ANODE, T-TARGET, V-CHAMBER, S-SUBSTRATE, P-PLASMA, G-SPUTTER GAS.

Fig.1.8. A typical chemical vapour deposition system.

Fig.1.9. A typical Triple-Zone furnace for GaAs deposition.

Fig.1.10. Schematic diagram of a Spray pyrolysis setup.

Chapter 2

Fig.2.1. Experimental arrangement for thin film deposition by the dip technique.

Fig.2.2. Variation of thickness of typical Al_2O_3 films with the speed of withdrawal of the substrate.

Fig.2.3. Variation of thickness of typical Al_2O_3 films with the concentration of the starting solution.

Fig.2.4. Diffraction pattern of Al_2O_3 film

(a) on glass substrate.

(b) on mica substrate.

Fig.2.5. An X-ray diffractogram of a typical Al_2O_3 film deposited by the dip technique.

Fig.2.6. An X-ray diffractogram of a typical SnO_2 film deposited by the dip technique.

Fig.2.7. A scanning Electron Micrograph of a typical Al_2O_3 film deposited by the dip technique.

Chapter 3

Fig.3.1. Arrangements for the deposition of SnO_2 films. Figure (c) shows the location of the $SnCl_2$ band with respect to the substrate.

Fig.3.2. An X-ray diffractogram of a typical SnO_2 film.

Fig.3.3. A scanning electron micrograph of a typical SnO_2 film.

Fig.3.4. Optical transmission versus wavelength for typical SnO_2 films of various sheet resistance (a) Undoped: (---), 475 Ω/□ (-..-..-), 670 Ω/□ ; (——), 860 Ω/□ ; (.-.-.), 1400 Ω/□ ; (.....) bare substrate. (b) Sb-doped (2 at.%): (-----), 110 Ω/□ ; (-.--.-), 550 Ω/□ ; (———) 870 Ω/□ ; (.....), bare substrate.

Fig.3.5. Sheet resistance ——— thickness relationship for undoped and 2 at.% Sb-doped SnO_2 films prepared at various substrate temperatures : 370°C, 430°C and 400°C.

Fig.3.6. Average (between 400 nm - 700 nm) optical transmission - sheet resistance relation for undoped and Sb-doped (2 at.%) SnO_2 film on soda-glass substrate.

Chapter 4

Fig.4.1. Variation in thickness of CdS films on glass substrate with number of dippings (T_B = 400°C).

Fig.4.2. X-ray diffractograms of CdS thin films on glass substrate for different Cd:S ratios (double dipping; T_B = 400°C; CuK_α radiation).

Fig.4.3. X-ray diffractograms of CdS, ZnS and $Cd_{0.8}Zn_{0.2}S$ thin films on glass substrates (double dippings; M:S = 1:1; T_B = 400°C; CuK_α radiation).

Fig.4.4. (a) Electron micrograph of CdS thin films on glass substrates with Cd:S ratios 1:2, 2:1, and 1:1, single dipping, deposited at baking temperature, T_B = 250°C.

Fig.4.4. (b) Electron micrograph of CdS thin films on glass substrates with Cd:S ratios 1:2, 2:1 and 1:1, single dipping, deposited at baking temperature, T_B = 400°C.

Fig.4.5. Electron micrograph of CdS thin films on glass substrates for various deposition conditions. (Cd:S = 1:1), single dipping, (a) baking temperature T_B = 200°C, (b) T_B = 300°C, (c) T_B = 400°C.

Fig.4.6. Electron micrograph of CdS thin films on glass substrates for various deposition conditions (Cd:S = 1:1, baking temperature T_B = 400°C) (a) single dipping; (b) double dipping; (c) five dippings; (d) ten dippings.

Fig.4.7. Electron micrographs of CdS thin films on different substrates (Cd:S = 1:1; T_B = 400°C) : (a) on glass, double dipping; (b) on aluminium

sheet, double dipping; (c) on conducting tin oxide, single dipping; (d) on mica, double dipping.

Fig.4.8. (a) Electron micrograph of CdS films obtained with prebaking. Prebaking temperature = 70°C, Final baking temperature = 400°C.

Fig.4.8. (b) Electron micrograph for CdS film obtained by slow introduction of the substrate + liquid film into the furnace at a speed of .56 mm/sec.

Fig.4.9. Electron micrographs of (a) ZnS and (b) $Cd_{0.8}Zn_{0.2}S$ thin films deposited on glass substrates (double dipping; M:S = 1:1; T_B = 400°C).

Fig.4.10. Optical absorption curve of CdS (ten dippings), ZnS (double dipping) and $Cd_{0.8}Zn_{0.2}S$ (double dipping) films on soda-glass substrates (M:S = 1:1; T_B = 400°C).

Chapter 5

Fig.5.1. Schematic diagram of Electron Multipliers (Discrete and Continuous dynode).

Fig.5.2. Schematic diagram of a typical Parallel-Plate Electron Multiplier (PPEM).

Fig.5.3. A typical vacuum system for study of Electron multiplier characteristics.

Fig.5.4. Mounting and electrical connections of Parallel-plate electron multiplier test circuit.

Fig.5.5. Parallel-plate electron multiplier preamplifier circuit.

Fig.5.6. A typical output pulse from the parallel-plate electron multiplier.

Fig.5.7. (a) A typical photoconductive (PC) cell geometry.

(b) Test circuit for studying the photoresponse of a PC cell.

Fig.5.8. Scanning electron micrographs showing the effect of $CdCl_2$ concentration in the sensitising

solution on the morphology of CdS thin films (baking time, 3 min) : (a) 7.5 x 10^{-2}mol 1^{-1}, (b) 12.5 x 10^{-2}mol 1^{-1}, (c) 17.5 x 10^{-2}mol 1^{-1}.

Fig.5.9. Voltage —— Current (V-I) characteristics of a typical photoconductive cell for different illumination levels : line A, 1000 lx; line B, 200 lx; line C, 50 lx.

Fig.5.10. Equivalent luminance —— resistance (Φ-R) relation for a typical photoconductive cell, for two different baking times : Curve A, 7 min; Curve B, 3 min.

Fig.5.11. Normalised spectral response of photoconductivity for pure CdS (unsensitised) film.

Fig.5.12. Spectral response of photoconductivity for sensitised CdS films (normalised with respect to the maximum of the more sensitive sample) for two baking times : Curve A, 3 min; Curve B, 7 min.