FIGURE CAPTION

Chapter - 1  Basic structure of amorphous semiconductors

Figure
1.1 Schematic density of states diagrams for amorphous semiconductors.
1.1 a) Cohen-Fritzsche-Ovshinsky model.
1.1 b) The Davis-Mott model showing a band of compensated levels near the middle of the gap.
1.1 c) Modified Davis-Mott model.
1.1 d) A 'real' glass with defect states.
1.2 a) Illustration of the transfer of an electron from one chain and to another creating two charged defects D⁺ and D⁻. The reaction is assumed to be exothermic, the D⁺ defect forming a three fold co-ordinated atom.
1.2 b) The 2D⁰→D⁺+D⁻ reaction on a configurational co-ordinate diagram.
1.3 Structure and energy of various defect configuration in a two fold co-ordinated material (Arrow represents the spin of the electrons)
1.4 Experimental x-ray scattering curve of amorphous sample (A); total independent scattering curve (B); incoherent scattering (C); independent coherent scattering Nf² (D).

Chapter - 2  Chemical effects in x-ray absorption spectra; object and scope of the problem

2.1 Energy levels of an atom
2.2 The absorption edge and its extended fine structure.
2.3 An illustration of valence band and conduction band and its corresponding absorption edge and Kβ²,5 emission line for (a) metal (b) semiconductor (c) insulator.

Chapter - 3  Experimental

3.1 Intensity distribution in the continuous x-ray spectrum at a constant potential.
3.2  A plot of absorption curve at the different slope region of the continuous x-ray spectrum.
3.2 a) Flat region 3 of Fig 3.1
3.2 b) Region 3C of Fig 3.1
3.2 c) Region AB of Fig 3.1
3.3  A plot illustrating the parallel and perpendicular component of intensity of x-rays emitted from a target.
3.4  Bragg reflection of a photon, p₁ = incident momentum, p₂ = reflected momentum.
3.5  Setting of the plane crystal spectrograph.
3.6  Schematics of the spectrograph set up by De-Broglie.
3.7  Figures showing the inclination of the crystal planes on bending the crystal (a) plane crystal (b) bent crystal.
3.8  Focussing by a bent crystal on reflection by the transverse planes.
3.9  Johann setting or reflection mounting.
3.10 Johannsson setting for quartz crystal.
3.11 Weiensthein setting
3.12 Schematics of bent crystal reflection.
3.13 Inclined plane indicating the angle with respect to the surface (TT') and \( \gamma \) with respect to the normal.
3.14 The caustic circle.
3.15 Variation in defocussing at large angles of diffraction.
3.16 Tailing of lines in transmission and reflection geometries.
3.17 Diffraction by a bent thick crystal.
3.18 Calculation of the effect of crystal thickness.
3.19 Calculation of the effect of crystal thickness on the focussing.
3.20 Cauchois spectrograph with Radon House control unit.
3.21 Schematic drawing of the Laue spots of muscovite mica.
3.22 Illustrating the orientation of the mica sheet using a Laue pattern.
3.23 Crystal holder block.
3.24 The bent crystal.
3.25 Showing (a) the correct (b) the wrong position of the Rowland circle.
3.26 Use of aperture (AB) to stop the scattering from the metallic boundaries of the opening in the crystal holder.
3.27 Absorption screens.
3.28 Intensity vs energy curve for K-edge.

Chapter - 4  Measured wavelength of edges their widths and an estimate of their shifts in some chalcogenide glasses
4.1 Plots of composition dependent chemical shift of Ge and Se in Ge$_x$Se$_{1-x}$ system.
4.2 a) Plot of K-absorption edge of Ge in Ge$_x$Se$_{1-x}$ system.
4.2 b) Plot of K-absorption edge of Se in Ge$_x$Se$_{1-x}$ system.
4.3 Absorption process in semiconductors.
4.4 K$_{2}$ emission and K-absorption spectrum of selenium.
4.5 Schematic band structure of crystalline germanium, the number indicates how many states per atom each band contains.
4.6 Schematic band structure of crystalline selenium.
4.7 Tentative band structure of amorphous compounds (Ge$_x$Se$_{1-x}$).
4.8 Shape of selenium K-absorption edge a) crystalline b) amorphous.
4.9 Molecular structure of GeSe$_2$ glass

Chapter - 5 Extended x-ray absorption fine structure (EXAFS) studies
5.1 to E vs Q plots for fine structure of Ge in bulk as well as amorphous films of Ge-based glassy system.
5.6 to E vs Q plots for fine structure of Se in bulk as well as amorphous films of Ge-based glassy system.
5.12 E vs Q plots for fine structure of Se in bulk as well as amorphous films of Se-based glassy system.
5.14 K-absorption edges of germanium a) bulk b) amorphous film.

5.15 K-absorption edges of Ge in bulk Ge-based chalcogenide glassy system a) pure Ge film b) Ge\textsubscript{22}Se\textsubscript{78} c) Ge\textsubscript{22}Se\textsubscript{76} Bi\textsubscript{2} d) Ge\textsubscript{22}Se\textsubscript{68} Bi\textsubscript{10} e) Ge\textsubscript{22}Se\textsubscript{68} Sb\textsubscript{10} f) Ge\textsubscript{22}Se\textsubscript{68} Te\textsubscript{10}.

5.16 K-absorption edges of Ge in amorphous film of Ge-based chalcogenide glassy system a) pure Ge film b) Ge\textsubscript{22}Se\textsubscript{78} c) Ge\textsubscript{22}Se\textsubscript{76} Bi\textsubscript{2} d) Ge\textsubscript{22}Se\textsubscript{68} Bi\textsubscript{10} e) Ge\textsubscript{22}Se\textsubscript{68} Sb\textsubscript{10} f) Ge\textsubscript{22}Se\textsubscript{68} Te\textsubscript{10}.

5.17 K-absorption edges of selenium a) bulk b) amorphous film.

5.18 K-absorption edges of Se in bulk of Ge-based chalcogenide glassy system a) pure Se film b) Ge\textsubscript{22}Se\textsubscript{78} c) Ge\textsubscript{22}Se\textsubscript{76} Bi\textsubscript{2} d) Ge\textsubscript{22}Se\textsubscript{68} Bi\textsubscript{10} e) Ge\textsubscript{22}Se\textsubscript{68} Sb\textsubscript{10} f) Ge\textsubscript{22}Se\textsubscript{68} Te\textsubscript{10}.

5.19 K-absorption edges of Se in amorphous film of Ge-based chalcogenide glassy system a) pure Se film b) Ge\textsubscript{22}Se\textsubscript{78} c) Ge\textsubscript{22}Se\textsubscript{76} Bi\textsubscript{2} d) Ge\textsubscript{22}Se\textsubscript{68} Bi\textsubscript{10} e) Ge\textsubscript{22}Se\textsubscript{68} Sb\textsubscript{10} f) Ge\textsubscript{22}Se\textsubscript{68} Te\textsubscript{10}.

5.20 K-absorption edges of glassy selenium a) bulk b) amorphous film.

5.21 K-absorption edges of Se in bulk Se-based chalcogenide glassy system a) Se glass b) Se\textsubscript{80}Te\textsubscript{20} c) Se\textsubscript{80}Te\textsubscript{10}Sb\textsubscript{10}.

5.22 K-absorption edges of Se in amorphous films of Se-based chalcogenide glassy system a) Se glass b) Se\textsubscript{80}Te\textsubscript{20}.

5.23 to 5.28 n vs k plots of K-absorption edges of Ge in pure Ge and Ge-based chalcogenide system both in bulk as well as amorphous films.

5.29 to 5.34 n vs k plots of K-absorption of Se in pure Se and Ge-based chalcogenide system both in bulk as well as in amorphous films.

5.35 n vs k plots of K-absorption edges of Se in Se-based chalcogenide system both in bulk as well as amorphous films.
5.36 The plots of total phase shift \([-\delta_1(k)\)] with k for Ge.
   a) theoretical b) experimental.
5.37 The plots of total phase shift \([-\delta_1(k)\)] with k for Se
   a) theoretical b) experimental.
5.38 The plots of total phase shift \(\delta_1(k)\) with k for bulk
   and amorphous film of pure Ge.
5.39 The plots of total phase shift \(\delta_1(k)\) with k for bulk
   and amorphous film of pure Se.
5.40 The plots of total phase shift \(\delta_1(k)\) with k for Ge
   in bulk Ge-based chalcogenide glassy system.
5.41 The plots of total phase shift \(\delta_1(k)\) with k for Ge in
   amorphous films of Ge-based chalcogenide glassy system.
5.42 The plots of total phase shift \(\delta_1(k)\) with k for Se in
   bulk Ge-based chalcogenide glassy system.
5.43 The plots of total phase shift \(\delta_1(k)\) with k for Se in
   amorphous films of Ge-based chalcogenide glassy system.
5.44 The plots of total phase shift \(\delta_1(k)\) with k for Se in
   Se-based chalcogenide glassy system.