FIGURE CAPTIONS
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FIGURE

1.1 Various models suggested for amorphous semiconductors.

1.2(a) Illustration of the transfer of an electron from one chain end 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 $2D^0 \rightarrow D^+ + D^-$ 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).

2.1 X-ray diffraction curves of Ge-Se alloys.

2.2 Sample holder assembly used for the measurement of dc conductivity and photoconductivity.

2.3 Sample holder assembly used for the measurement of crystallization kinetics.

3.1 Molecular structure of GeSe$_2$ glass.

3.2 Temperature dependence of dark current for amorphous thin films of Ge$_x$Se$_{100-x}$.

3.3(a-b) Composition dependence of $\Delta E$ and $\sigma_0$ at room temperature.

3.4 Temperature dependence of steady state photocurrent at a particular intensity for amorphous thin films of Ge$_x$Se$_{100-x}$. 
3.5 Intensity dependence of steady state photocurrent at room temperature for amorphous thin films of Ge$_x$Se$_{100-x}$.

3.6 Composition dependence of $I_{ph}/I_d$ at room temperature.

3.7 Transient photoconductivity at room temperature at a particular intensity for amorphous thin films of Ge$_x$Se$_{100-x}$.

3.8 The decay of photocurrent with time at room temperature for amorphous thin films of Ge$_x$Se$_{100-x}$.

3.9 In $I_{ph}$ vs time curves for amorphous thin films of Ge$_x$Se$_{100-x}$ after subtracting the persistent photocurrent.

3.10 Time dependence of $\tau_d$ at room temperature for amorphous thin films of Ge$_x$Se$_{100-x}$.

3.11 Composition dependence of $\tau_d$ (t=30 sec) at room temperature.

4.1 Temperature dependence of dark and steady state photocurrent in amorphous thin films of Ge$_{22}$Se$_{78}$.

4.2 Rise and decay of photocurrent with time in Ge$_{22}$Se$_{78}$ at various temperatures.

4.3 Rise and decay of photocurrent with time in Ge$_{22}$Se$_{78}$ at 302 K at various intensities.

4.4 Rise and decay of photocurrent with time in Ge$_{22}$Se$_{78}$ at 352 K at various intensities.

4.5 Rise and decay of photocurrent with time in Ge$_{22}$Se$_{78}$ at 352 K at different illumination times.
4.6 $\ln I_{ph}$ vs time curves for the decay of photocurrent in Ge$_{22}$Se$_{78}$ at different temperatures. The data of Fig 4.2 is plotted after subtracting the persistent photocurrent at each temperature.

4.7 $\ln I_{ph}$ vs time curves for the decay of photocurrent in Ge$_{22}$Se$_{78}$ at 352 K at various intensities. The data of Fig 4.4 is plotted after subtracting the persistent photocurrent at each intensity.

4.8 $\ln I_{ph}$ vs time curves for the decay of photocurrent in Ge$_{22}$Se$_{78}$ at 352 K at various illumination times. The data of Fig 4.5 is plotted after subtracting the persistent photocurrent at each illumination time.

4.9 Differential lifetime $\tau_d$ as a function of time for the decay curve of Fig 4.6 (348 K).

4.10 Differential lifetime $\tau_d$ at $t=20$ sec as a function of temperature.

4.11 Differential lifetime $\tau_d$ at $t=20$ sec as a function of intensity.

4.12 Differential lifetime $\tau_d$ at $t=20$ sec as a function of illumination time.

4.13(a) Density of states model.

4.13(b) Recombination transitions.

5.1 Rise of photocurrent with time at different temperatures in red light (660 nm) at an intensity of 210 A.U.
5.2 Rise of photocurrent with time at different temperatures in violet light (420 nm) at an intensity of 210 A.U.

5.3 Rise of photocurrent with time at 352 K in the light of different wavelengths at an intensity of 210 A.U.

5.4 Rise of photocurrent with time at 352 K in violet light (420 nm) of different intensities (1 to 210 A.U.).

5.5 Intensity dependence of steady state photocurrent in red light (660 nm) at 302 K and 370 K.

5.6 Intensity dependence of steady state photocurrent in violet light (420 nm) at 302 K and 370 K.

5.7 Decay of photocurrent with time at different temperatures after illuminating the sample for 90 sec in red light (660 nm).

5.8 Decay of photocurrent with time at different temperatures after illuminating the sample for 90 sec in violet light (420 nm).

5.9 Decay of photocurrent with time at 352 K after illuminating the sample for 90 sec in the light of different wavelengths.

5.10 Decay of photocurrent with time at 352 K after illuminating the sample for 90 sec in violet light (420 nm) of different intensities.
5.11 Decay of photocurrent with time at 352 K after illuminating the sample in violet light (420 nm) for different time period.

5.12 A model to explain the anomalous decay of photocurrent (a) in presence of light (b) after putting the light off (but not in steady state).

6.1 Annealing time dependence of dc conductivity for Ge\textsubscript{5}Se\textsubscript{95} sample during different isothermal amorphous crystal phase transformations.

6.2 Annealing time dependence of dc conductivity for Ge\textsubscript{10}Se\textsubscript{90} sample during different isothermal amorphous crystal phase transformations.

6.3 Annealing time dependence of dc conductivity for Ge\textsubscript{15}Se\textsubscript{85} sample during different isothermal amorphous crystal phase transformations.

6.4 Annealing time dependence of dc conductivity for Ge\textsubscript{22}Se\textsubscript{78} sample during different isothermal amorphous crystal phase transformations.

6.5 Temperature dependence of total time \(\tau\) of transformation.

6.6 Crystallinity percentage vs annealing time for Ge\textsubscript{5}Se\textsubscript{95} crystallized for different isotherms.

6.7 Crystallinity percentage vs annealing time for Ge\textsubscript{10}Se\textsubscript{90} crystallized for different isotherms.
6.8 Crystallinity percentage vs annealing time for $\text{Ge}_{15}\text{Se}_{85}$ crystallized for different isotherms.

6.9 Crystallinity percentage vs annealing time for $\text{Ge}_{22}\text{Se}_{78}$ crystallized for different isotherms.

6.10 Avrami plot of the crystallization of $\text{Ge}_{5}\text{Se}_{95}$ for different isotherms.

6.11 Avrami plot of the crystallization of $\text{Ge}_{10}\text{Se}_{90}$ for different isotherms.

6.12 Avrami plot of the crystallization of $\text{Ge}_{15}\text{Se}_{85}$ for different isotherms.

6.13 Avrami plot of the crystallization of $\text{Ge}_{22}\text{Se}_{78}$ for different isotherms.

6.14 Arrhenius plots for different stages of crystallization of $\text{Ge}_x\text{Se}_{100-x}$. 