Figure 3.1. EDS pictures of the present glass system

$x\text{ZnF}_2-(20-x)\text{ZnO-40As}_2\text{O}_3-40\text{TeO}_2$ (x = 0, 4, 8, 12, 16 and 20 mol %)
Figure 3.2 Density and molar volume as a function of ZnF$_2$ content in xZnF$_2$-(20-x)ZnO-40As$_2$O$_3$-40TeO$_2$ glasses
Figure 3.3. Variation of Young’s modulus and Bulk modulus as a function of ZnF$_2$ content in xZnF$_2$-(20-x)ZnO-40As$_2$O$_3$-40TeO$_2$ glasses.
Figure 3.4. Variation of Shear modulus and Poisson’s ratio as a function of ZnF$_2$ content in xZnF$_2$-(20-x)ZnO-40As$_2$O$_3$-40TeO$_2$ glasses.
Figure 3.5. log(K) verses log(V_m) plot of present glass system.
Figure 3.6 Variation of Debye temperatures as a function of ZnF$_2$ content in $x$ZnF$_2$-(20-$x$)ZnO-40As$_2$O$_3$-40TeO$_2$ glasses.
Figure 3.7. DSC thermograms of the present glass samples.
Figure 3.8. Variation of $T_g$, $T_c$ and $S$ as a function of ZnF$_2$ content of the present glasses.
Figure 4.1. Optical absorption spectra of $x\text{ZnF}_2-(20-x)\text{ZnO}-40\text{As}_2\text{O}_3-40\text{TeO}_2$ glasses.
Figure 4.2. Variation of cut-off wavelength as a function of ZnF$_2$ content.
Figure 4.3. UV transmittance and reflectance spectra of the present glasses.
Figure 4.4. (a) The relation between $(\alpha_h \nu)^{1/2}$ against photon energy $h\nu$ of the present glasses.
Figure 4.4. (b) The relation between $(\alpha \cdot h\nu)^2$ against photon energy $h\nu$ of the present glasses.
Figure 4.4. (c) The relation between $(\alpha h\nu)^{2/3}$ against photon energy $h\nu$ of the present glasses.
Figure 4.4. (d) The relation between $(\alpha h \nu)^{1/3}$ against photon energy $h \nu$ of the present glasses.
Figure 4.5 (a). Variation of refractive index as a function of wavelength for the present glass system.

Figure 4.5 (b). Variation of extinction coefficient as a function of wavelength for the present glass system.
Figure 4.6 variation of real part of dielectric constant, $\varepsilon_1$, with the photon energy $h\nu$ for the present glass samples.
Figure 4.7. Variation of $\varepsilon_2$ as a function of photon energy in the present glasses.
Figure 4.8. Variation of indirect allowed band gap energy as function of ZnF$_2$ in the present glasses.
Figure 4.9. Variation of the real part of dielectric constant $\varepsilon_1$ with $\lambda^2$ in the present glass system.
Figure 4.10. The variation of $1/(n^2-1)$ with $(h\nu)^2$ in the present glasses.
Figure 4.11. Variation of $\ln (\alpha)$ as function of photon energy $h\nu$. 
Figure 4.12. Variation of theoretical optical basicity $A_{th}$ as a function of ZnF$_2$ of the present glasses.
Figure 5.1. FTIR absorption spectra of $x\text{ZnF}_2-(20-x)\text{ZnO-40As}_2\text{O}_3-40\text{TeO}_2$ glasses.
Figure 5.2. Deconvoluted IR spectra of $16\text{ZnF}_2 - 4\text{ZnO} - 40\text{As}_2\text{O}_3 - 40\text{TeO}_2$ glass.

Figure shows a graph with absorbance on the y-axis and wavenumber (cm$^{-1}$) on the x-axis. The peaks at 457, 597, 661, 778, and 883 are indicated with arrows.
Figure 5.3. Raman spectra of all the present glasses.
Figure 5.4. Deconvoluted Raman spectra of $20\text{ZnF}_2\text{–}40\text{As}_2\text{O}_3\text{–}40\text{TeO}_2$ glass.
Figure 5.5. Variation of intensity ratio of 746 cm\textsuperscript{-1} Raman band to 641 cm\textsuperscript{-1} Raman band as function of ZnF\textsubscript{2} content.

Figure 5.5. Variation of intensity ratio of 746 cm\textsuperscript{-1} Raman band to 641 cm\textsuperscript{-1} Raman band as function of ZnF\textsubscript{2} content.
Figure 6.2. RBS spectra of the unimplanted $4\text{ZnF}_2-16\text{ZnO}-40\text{As}_2\text{O}_3-40\text{TeO}_2$ glass.
Figure 6.3. RBS spectra of 150 keV nitrogen implanted 4ZnF$_2$-16ZnO-40As$_2$O$_3$-40TeO$_2$ glass at $5 \times 10^{16}$ and $5 \times 10^{17}$ ions/ cm$^2$ doses.
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Figure 6.5. RBS spectra of 150 keV nitrogen implanted 20ZnF₂-40As₂O₃-40TeO₂ glass at $5 \times 10^{16}$ and $5 \times 10^{17}$ ions/cm² doses.
Figure 6.6. Model for blanket implantation.

Gaussian Profile

\[ N(x) = N_p \exp\left[-\frac{(x - R_p)^2}{2\Delta R_p^2}\right] \]

- \( R_p \) = Projected Range
- \( \Delta R_p \) = Straggle

Dose

\[ Q = \int_{0}^{\infty} N(x)\,dx = \sqrt{2\pi N_p \Delta R_p} \]
Figure 6.7. Penetration depth profiles of the N$^+$ ions in 4ZnF$_2$-16ZnO-40As$_2$O$_3$-40TeO$_2$ glass.
Figure 6.8. The penetration depth profiles of the $\text{N}^+$ ions in $20\text{ZnF}_2-40\text{As}_2\text{O}_3-40\text{TeO}_2$ glass.
Figure 6.9. Scanning electron micrographs of the 150 keV, $5 \times 10^{17}$ ions/cm$^2$ nitrogen implanted $4\text{ZnF}_2\cdot16\text{ZnO}\cdot40\text{As}_2\text{O}_3\cdot40\text{TeO}_2$ glass.
Figure 6.10. Scanning electron micrographs of $5 \times 10^{17}$ ions/cm$^2$ nitrogen implanted 20ZnF$_2$-40As$_2$O$_3$-40TeO$_2$ glass sample.
Figure 6.11 Transmission spectra of nitrogen implanted 4ZnF$_2$-16ZnO-40As$_2$O$_3$-40TeO$_2$ glass at 150 keV for $5 \times 10^{16}$ ions/cm$^2$ and $5 \times 10^{17}$ ions/cm$^2$ doses.

Figure 6.12. Transmission spectra of nitrogen implanted 20ZnF$_2$-40As$_2$O$_3$-40TeO$_2$ glasses.
Figure 6.13. The variation of optical absorption with wavelength for the nitrogen implanted $4\text{ZnF}_2-16\text{ZnO-40As}_2\text{O}_3-40\text{TeO}_2$ glass.

Figure 6.14. The variation of optical absorption with wavelength for the nitrogen implanted $20\text{ZnF}_2-40\text{As}_2\text{O}_3-40\text{TeO}_2$ glass.
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Figure 1.1. Variation in volume with temperature for glassy and crystalline solids.
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Figure. 2.10 The photograph of the 1.7 MV tandetron accelerator.
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Photograph of prepared $x\text{ZnF}_2-(20-x)\text{ZnO-40As}_2\text{O}_3-40\text{TeO}_2$ glasses.
4ZnF$_2$-16ZnO-40As$_2$O$_3$-40TeO$_2$ Nitrogen implanted glasses

20ZnF$_2$-40As$_2$O$_3$-40TeO$_2$ Nitrogen implanted glasses

Figure 6.1. Sample holder of 1.7 MeV tandetron accelerator.