## Chapter 1

- Figure 1.1: InBi crystal structure: tetragonal P4/nmm phases.
- Figure 1.2: Phase diagram of InBi

Chapter 2

- Figure 2.1: Weighing Balance
- Figure 2.2: Vacuum Sealing Unit
- Figure 2.3: Alloy mixing furnace
- Figure 2.4: Zone Melting Unit
- Figure 2.5: Scanning Electron Microscope and EDAX System Setup
- Figure 2.6: Experimental arrangement of a typical Powder XRD set-up
- Figure 2.7: Pelletizer Unit
- Figure 2.8: FTIR spectrometer photograph
- Figure 2.9: FTIR Spectrophotometer
- Figure 2.10: Thermoelectric power measurement set up
- Figure 2.11: The Hall measurement set up
- Figure 2.12: Micro hardness testing unit with the microscope

Chapter 3

- Figure 3.1: Plot of the temperature versus distance in the zone melting furnace.
- Figure 3.2: Striation in the case of InBi<sub>0.95</sub>Te<sub>0.05</sub>
- Figure 3.3: As grown crystal of InBi<sub>0.90</sub>Te<sub>0.10</sub>
- Figure 3.4: The XRD Plot of InBi
- Figure 3.5: The XRD Plot of InBi<sub>0.95</sub>Te<sub>0.05</sub>
- Figure 3.6: The XRD Plot of InBi<sub>0.90</sub>Te<sub>0.10</sub>
- Figure 3.7: The XRD Plot of InBi<sub>0.85</sub>Te<sub>0.15</sub>
- Figure 3.8 (a-c): FESEM images and (d) Energy dispersive spectra of InBi crystal,
- Figure 3.9 (a-c): FESEM images and (d) Energy dispersive spectra of InBi<sub>0.95</sub>Te<sub>0.05</sub> crystal
- Figure 3.10: Colour mapping of InBi<sub>0.95</sub>Te<sub>0.05</sub> crystal
- Figures 3.11(a-c): FESEM images and (d) Energy dispersive spectra of InBi<sub>0.90</sub>Te<sub>0.10</sub> crystal
- Figure 3.12. Colour mapping of InBi<sub>0.90</sub>Te<sub>0.10</sub> crystal, respectively.
- Figures 3.13(a-c): FESEM images and (d) Energy dispersive spectra of InBi<sub>0.85</sub>Te<sub>0.15</sub>, crystal
- Figure 3.14 Colour mapping of InBi<sub>0.85</sub>Te<sub>0.15</sub> crystal

## Chapter 4

Figure 4.1: Band Structure Figure 4.2: Plot of  $(\alpha hv)^2 vs hv for InBi_{0.95}Te_{0.05} crystal$ Figure 4.3: Plot of  $(\alpha hv)^2 vs hv for InBi_{0.90}Te_{0.10} crystal$ Figure 4.3: Plot of  $(\alpha hv)^2 vs hv for InBi_{0.90}Te_{0.10} crystal$ Figure 4.3: Plot of  $(\alpha hv)^2 vs hv for InBi_{0.90}Te_{0.10} crystal$ Figure 4.5: Plot of Band GapEg V/s Te<sub>x</sub> Figure 4.6: Schematic representation of Hall Effect in a conductor. Figure 4.7: Block diagram of sample holder of TEP set up Figure 4.8: Plot of S (thermo emf) vs T (temperature) for InBi\_{0.95}Te\_{0.05} crystal Figure 4.9: Plot of S (thermo emf) vs T (temperature) for InBi\_{0.90}Te\_{0.10} crystal Figure 4.10: Plot of S (thermo emf) vs T (temperature) for InBi\_{0.85}Te\_{0.15} crystal Figure 4.11: Plot of S (thermo emf) vs 1/T for InBi\_{0.90}Te\_{0.10} crystal Figure 4.12: Plot of S (thermo emf) vs 1/T for InBi\_{0.90}Te\_{0.10} crystal Figure 4.13: Plot of S (thermo emf) vs 1/T for InBi\_{0.95}Te\_{0.15} crystal

## Chapter 5

Figure 5.1: Vickers Indentor

Figure 5.2(a): Plot of H<sub>v</sub> versus P of InBi crystals

Figure 5.2(b): Plot of H<sub>v</sub> versus P of InBi<sub>0.95</sub>Te<sub>0.05</sub> crystals

Figure 5.2(c): Plot of H<sub>v</sub> versus P of InBi<sub>0.80</sub>Te<sub>0.10</sub> crystals

Figure 5.2(d): Plot of H<sub>v</sub> versus P of InBi<sub>0.85</sub>Te<sub>0.15</sub> crystals

Figure 5.2(e): Plots of  $H_V$  versus P of  $InBi_{1-x}Te_x$  (x = 0, 0.05, 0.1, 0.15) crystals

Figure 5.3: Plots of lnp vs lnd  $InBi_{1-x}Te_x$  (x= 0, 0.05, 0.1, and 0.15) crystals

Figure 5.4(a): Plot of H<sub>v</sub> versus P of InBi crystals annealed crystals

Figure 5.4(b): Plot of H<sub>v</sub> versus P of InBi0.95Te0.05crystals annealed crystals

Figure 5.4(c): Plot of H<sub>v</sub> versus P of InBi<sub>0.9</sub>Te<sub>0.10</sub> crystals annealed crystals

Figure 5.4(d): Plot of H<sub>v</sub> versus P of InBi<sub>0.85</sub>Te<sub>0.15</sub>crystals annealed crystals

Figure 5.5(a): Plot of H<sub>v</sub> versus P of InBi crystals

Figure 5.5(b): Plot of H<sub>v</sub> versus P of InBi<sub>0.95</sub>Te<sub>0.05</sub> crystals

**Figure 5.5(c):** Plot of H<sub>v</sub> versus P of InBi<sub>0.90</sub>Te<sub>0.10</sub> crystals

Figure 5.5(d): Plot of H<sub>v</sub> versus P of InBi<sub>0.85</sub>Te<sub>0.15</sub> crystals