CONCLUSIONS
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The main conclusions of this thesis are:

(i) To obtain a pure high $T_c$ phase (2223) of Bi-based superconductors is very difficult and its formation depends on initial composition and synthesis conditions.

(ii) Pb is an essential component for enhanced formation of 2223 phase. Sr-deficient (Sr concentration of 1.8 and 1.6) composition leads to a purer 2223 phase.

(iii) Effect of oxygen/vacuum annealing is dependent of composition, unlike RE-based superconductors, where oxygen deficiency always leads to a degradation in transition temperature. If once the initial composition is optimized oxygen or air annealing does not improve the quality of the sample but vacuum annealing certainly degrades it.

(iv) Sb and Li doping at Bi site does not result in transition temperature higher than 110K. Small amount of Sb (0.1) increases the $T_{c0}$ of Pb doped 2223 specimens, but further increase in Sb concentration (0.2) reduces the $T_{c0}$ drastically. Whereas Li doping always leads to a reduction in transition temperature.

(v) Sb doping results in formation of new Cu-deficient phase
namely \((\text{Bi}, \text{Pb}, \text{Sb})_4 \text{Sr}_4 \text{Ca}_4 \text{Cu}_1 \text{O}_y\).

(vi) Ag addition reduces \(T_{c0}\) drastically, even a small addition of Ag (5 wt%) reduces \(T_{c0}\) and XRD shows reflections corresponding to pure Ag. Intensity of these reflections increases with increasing Ag concentration.

(vii) TEP of all the specimens (Sb, Li doped and Ag added) is positive and rises almost linearly with decreasing temperature, before going to zero at \(T_{s0}\). TEP of these superconductors can not be understood on the basis of existing theories. We have shown that TEP of these systems can be fitted to the formula derived from marginal Fermi liquid hypothesis successfully in the temperature range of 130K to 300K. From this expression along with resistivity data other parameters like Fermi energy, coupling constant etc. can be calculated.

(viii) These fits do indicate a very small phonon-drag contribution to overall TEP.

(ix) The idea of lower percolation threshold for TEP is investigated and it is shown both by, using percolation argument and by effective medium approximation, that the TEP of a random binary mixture of which one component is a superconductor will be zero as long as there exists a non-zero fraction of superconductor.
The data presented in this thesis is a small step in resolving some of the ambiguities in normal state TEP of these materials, still there are some unresolved questions, like the change of TEP sign from positive to negative observed at higher temperatures. For explaining this observed fact theoretical calculations should be modified taking into account the two types of carriers.