Crystal growth is an important field of materials science which has got scientific as well as technological importance. Scientific importance of the subject is mainly related to the growth of single crystals and its characterization while the technological importance is dealing with the growth of large single crystals and its application on device fabrication. The present research work (reported in this thesis) is of scientific in nature and not technological.

Alkali halide crystals are widely used as laser window materials, neutron monochromators, infrared prisms, infrared transmitters, etc. But the use of pure alkali halides are limited by the mechanical systems and hence there exist the need to strengthen them. The mixed and impurity added (doped) crystals of alkali halides are found to be harder than the end members and so they are more useful in these applications. In view of the overall importance of the alkali halides there has been continuing activity in all aspects of alkali halides. As a result, a wide body of literature is also available.

In the present work, some investigations have been carried out on the growth and characterization of \((\text{NaCl})_x(\text{KCl})_y(\text{KBr})_{1-y}\) single crystals. As our aim was to grow crystals needed for characterization only, growth of large single crystals normally required for device fabrication were not carried out. Since the present investigation revealed the increase in hardness in ternary mixed crystals, an extensive study on the growth of large single crystals and its application as device fabrication is expected to bring fruitful results in the future.
Present investigations on \((\text{NaCl})_x(\text{KCl})_y(\text{KBr})_{1-y}\) crystals were carried out on crystals with \(y = 0.2, 0.4, 0.5, 0.6\) and 0.8 and \(x\) varying in steps of 0.1. An extension of the investigation on crystals with \(y = 0.1, 0.3\) and 0.7 and \(x\) in steps of 0.1 may help to obtain a well established relation between composition and properties.

As there are two phases in crystals with higher NaCl content, single crystal X-ray diffraction analysis can be extended to find out the atomic positions.

D.C. electrical conductivity measurements are limited to various temperatures ranging from 35 - 150°C. In this region, D.C. conductivity of mixed crystals are found to be greater than that of the end member crystals. More useful results can be derived, if the study is extended to lower and higher temperatures.

Dielectric measurements also may be extended to lower and higher temperatures and at different frequencies. Though a large amount of research work have been carried out on alkali halides and mixed crystals of them, still several more investigations are necessary to be carried out for a better understanding of the materials and thereby to find out new applications.

The remark made by Seitz (in 1946) in his well known article on colour centers, "In the field of solids, the properties of alkali halides have an enduring interest, since these crystals have continuously yielded to persistent investigation and gradually provided us with a better and better understanding of the most interesting properties of all solids", still seems to be relevant.