FUTURE SCOPES

Indium antimonide and its alloys are one-of-a-kind substances. They're great thermoelectric materials, and they're just as significant in the thermoelectric sector – for cooling and energy generation – as silicon is in the electronic industry. Indium Antimonide has the potential to greatly boost the speed of microchip functions and serve as the foundation for "Spintronics," a next-generation technology. Spintronics is a revolutionary (though still in its infancy) technology in which the intrinsic spin of electrons, rather than the voltage value employed in today's electronics, is used to store and transfer information that can be interpreted as a "1" or a "0". Topological insulators, which scientists have been seeking for for years and have finally found in indium antimonide, are the best materials to use in the field of Spintronics. Topological insulators have the virtue of offering no resistance to an electrical flow near their surface, allowing for very efficient heat dissipation.

Integration of efficient solid state thermoelectric micro devices with microelectronics is desirable for both local cooling and thermoelectric micro generation. Antimonide alloys are well-established room-temperature thermoelectric materials that are widely used in the thermoelectric industry due to their high Seebeck coefficient, low electrical resistivity and relatively low thermal conductivity.

Thin-film planar technology can scale down conventional bulk thermoelectric devices to the micron size range or even to nanothin film. Thin film technology allows for an enlarged choice of the type of substrate, for the possibility of patterning the devices to micro or sub-micro dimensions and for easy integration with standard Si technology.

Application of radiation in semiconductor technology is of great importance in achieving some desired improvement in crystal properties. Ion beam treatment provides a unique way to modify the chemical, structural, optical, mechanical and electrical properties of crystal by causing irreversible changes in their macromolecular structure. It can be used to change, in a controlled way, the physical properties of thin films or to modify the near-surface characteristics of a bulk crystal. The ion beam irradiation affects the crystal structure by ion impants as well as by degradation. So ion beam treatment can be used for these crystals to modify their properties.

Further, photoconductivity and electrical properties of thin films, chemical etching, creep and quench micro hardness of the crystals can be studied.