For typical semiconductors of simple hand structure the effect of pressure should be to reduce, and ultimately to eliminate the gap between the conduction and valence band, converting an insulator or semiconductor into a metal. This may take place with no change in crystal structure or through a polymorphic transition to a new phase, in which case the change in gap is discontinuous. For semiconductors of complex band structure, such as germanium or gallium arsenide, the changes in gap with pressure can help elucidate the structure.

In the simplest picture, the effect of pressure on the resistance of a metal is straightforward to analyze qualitatively. The decrease in interatomic distance should decrease the amplitude of vibration and "stiffen" the structure. Thus increasing the pressure acts in the opposite direction from increasing temperature, and should result in a decrease in resistivity. This indeed occurs for such metals as gold, silver, copper, and many others. There exist a significant number of cases where there are more complex,and more interesting, effects of interatomic distance on band structure. Here pressure experiments can add much to our understanding. In addition, there exist possibilities of polymorphic transitions with a variety of possible effects on electronic structure.

Alkali Halide Phosphors

One of the most useful and most thoroughly studied types of phosphors consists of an alkali halide crystal with a fraction of a percent Tl^+ ion dissolved in it. The Tl^+ ion substitutes for an alkali ion at a lattice site. There is an optical absorption band in the near ultraviolet and an emission peak in the visible. We shall be here concerned with the nature of the absorption band.