In 1961, I. Shima and N. Tanaka observed a phenomenon that they called 'electron-injection' in GaAs. They found that when a GaAs crystal is illuminated with light, electrons are excited from the valence band to the conduction band. This optical excitation of electrons leads to a decrease in the electrical conductivity of the material. The term 'electron-injection' refers to the process of injecting free electrons into the conduction band from the valence band, which results in an increase in the electrical conductivity of the material.

The observation of electron-injection in GaAs has important implications for the field of semiconductor electronics. It has led to the development of various devices, such as phototransistors and photodiodes, which are used in a wide range of applications, including telecommunications, computing, and medical imaging.

In the diagram attached to this note, we can see a graph illustrating the relationship between the light intensity and the electrical conductivity of a GaAs crystal. The graph shows that as the light intensity increases, the electrical conductivity also increases, confirming the phenomenon of electron-injection.

Moreover, the diagram also includes a comparison with two other materials, A and B, to highlight the unique properties of GaAs in the context of electron-injection. This comparison is useful for researchers and engineers who are interested in developing new technologies that utilize the principles of electron-injection.