

Abstract

Semiconductors are solid materials that have a crystalline structure and exhibit properties that differ from both good conductors like metals and insulators such as glass. Semiconductors offer versatile properties that are influenced by temperature and controlled doping. Hall effect measurements are essential for characterizing semiconductor materials and determining important electrical parameters that are crucial for device performance and manufacturing consistency. A Hall effect measurement system is a versatile tool that provides insights into material parameters such as charge carrier concentration, specific resistivity, and mobility. The accuracy of these measurements is vital for precisely determining the desired material properties and enabling the development of high-performance devices.

The focus of this research is the development of a measurement system for determining the properties of semiconductors using Hall effect and Van der Pauw measurements. Initially, the user specifies the current to be passed through the semiconductor sample, the name of the sample, its thickness, and the strength of the magnetic field in the Hall effect test. The measurement algorithm is then executed. Measured properties include specific resistivity, charge carrier concentration, or mobility. After the measurement results for the sample have been recorded, the test results are displayed on the designed graphical user interface and saved as PDF and CSV files on the computer.