Measurement of: Seebeck Coefficient (Thermopower) and Resistivity

Equipment: Seebeck Coefficient and Electrical Resistivity System (Ulvac ZEM-3)

Property Measured: Seebeck coefficient (Thermopower) and Resistivity

Photograph (small size)

Basic Principle:

The Seebeck coefficient of a material is a measure of the magnitude of an induced thermoelectric voltage in response to a temperature difference across that material, as induced by the Seebeck effect. A prism or cylindrical sample is set in a vertical position between the upper and lower blocks in the heating furnace. While the sample is heated to, and held, at a specified temperature, it is heated by the heater in the lower block to provide a temperature gradient. Seebeck coefficient is measured by measuring the upper and lower temperatures T1 and T2 with the thermocouples pressed against the side of the sample, followed by measurement of thermal electromotive force dE between the same wires on one side of the Heating furnace thermocouple. Electric resistance is measured by the dc four terminal method, in which a constant current I is applied to both ends of the sample to measure and determine voltage drop dV between the thermo-electromotive force between leads.

Capabilities: Seebeck coefficient and electrical resistance can be measured from room temperature to 900°C in Helium atmosphere.

Sample Requirement: Rectangular Solid samples (maximum of: 4mm thick x 4mm width x 12 mm height), (minimum of: 2mm thick x 2mm width x 12 mm height) are required