ADVANCE RIKO

Seebeck Coefficient / Electric Resistance Measurement System

ZEM-3 series

Simultaneous measurement of the Seebeck coefficient and electrical conductivity of thermoelectric materials

◆ General Description

Thermal power generation is a method of generating power based on the thermoelectric effect which was discovered by J. T. Seebeck, German physicist in 1821. In the face of recent global warming caused by carbon dioxide and depletion of fossil fuels, thermoelectric conversion devices are attracting attention because of its effective utilization of waste heat energies. To meet these pressing requirements, ADVANCE RIKO has developed a characteristic evaluating instrument for these materials and devices.

◆ Features

1. The sample holder uses a unique balance contact mechanism, permitting measurement of high reproducibility.
2. V-I plot measurement can be made to judge if the lead is in intimate contact with a set sample.
3. The system automatically examines whether the contact of the two probes with a sample ohmic or not, and finds and uses the best value of electric current to determine the resistivity of the sample without the influence of heat transfer.
4. Measurement is controlled by a computer, permitting automatic measurement with each temperature difference at a specified temperature and elimination of dark electromotive force.
5. Measured raw data is saved in text format.

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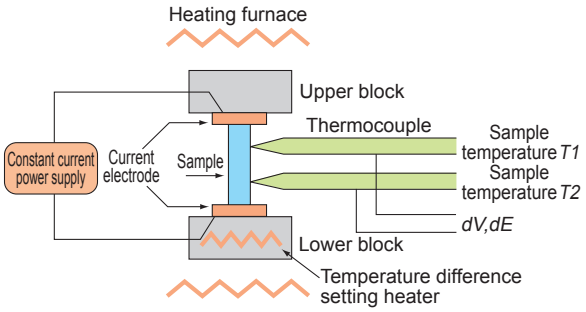
◆ Measurement principle

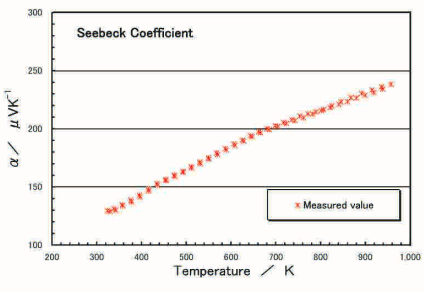
A prism or cylindrical sample is set in a vertical position between the upper and lower blocks in the heating furnace. While the sample is heated, and held, at a specified temperature, it is heated by the heater in the lower block to provide a temperature gradient. Seebeck coefficient is measured by measuring the upper and lower temperatures T_1 and T_2 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 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 same wires of the thermocouple by subtracting the thermo-electromotive force between leads.

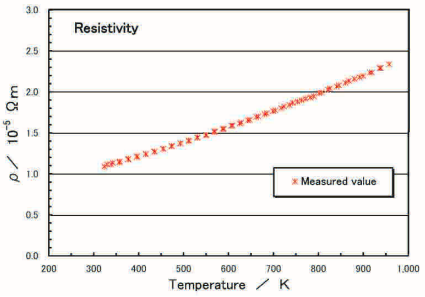


◆ Specifications

1. Temperature range	– 80 to 100 ℃ (L type) 50 ℃ to 800 ℃ (M8 type) 50 ℃ to 1000 ℃ (M10 type)
2. Temperature setting range	Number of measurement temperature steps and number of temperature sample measurement difference steps : Maximum 125
3. Measurement method	Seebeck coefficient : Static dc method Electric resistance : Four-probe method
4. Atmosphere	Low pressure helium gas
5. Sample size	2 to 4 mm square or diameter × 5 to 22 mm long
6. Lead interval	4, 6, 8 mm
7. Power requirements	200 VAC, single phase, 40 A (M8 type & M10 type) 100 VAC, 20 A (L type & M8 type & M10 type)
8. Cooling water requirements	City water, water pressure 0.15 MPa or more Flow rate 7 L/min. or more

◆ Measurement Example of P Type $Si_{80}Ge_{20}$ Sintered Compact





※Specification and appearance are subject to change without notice for performance improvement.

Agent

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