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Simple system to measure Seebeck effect coefficient at room temperature

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A system for measuring Seebeck coefficient has been designed and constructed which can be measures at room temperature. The system consists of three main parts, a temperature controlling, a data acquisition and a programming. The temperature controlling include of a PID temperature controller which fabricated by using an Arduino microcontroller boards. The data acquisition consists of two type-K thermocouple for measures hot side and cool side temperature of the system and a Seebeck voltage measuring circuits for detected the voltage which generated from a thermoelectric materials. The programming part was developed on personal computer for monitoring temperature and Seebeck voltage and controlling the hot side temperature of the system during measuring. The hot side temperature was controlled with the range of 25 to 150 Celsius degrees. The hot side and the cool side temperature were measured with the range of 25 to 500 Celsius degrees and have the resolution of 0.01 Celsius degrees. The Seebeck voltage was detected with the resolution of 1 microvolt by using the fabricated circuits. The developed program was displayed a graph of the voltage with the temperature difference between hot side and cool side. This part was controlled the temperature range of the hot side temperature and real time showed the temperature and the voltage. The Seeback coefficient was evaluated and displayed when the data collects was finished.

Keyword : Thermoelectric materials, Seebeck effect, Seebeck voltage.

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