

# PERFORMANCE EVALUATION OF THERMOELECTRIC MATERIALS CONSIDERING THE TEMPERATURE DEPENDENCE PROPERTIES

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## ABSTRACT

Introduction of efficient, economical and durable thermoelectric devices can be a game-changer in the field of renewable energy generation and utilization. Since, major bottlenecks in the field of research of the thermoelectric devices lie in the research of thermoelectric materials, it becomes highly important to document the data on every promising thermoelectric material. The involvement of the phenomena such as Thomson effect, Joule heating effect and Peltier heating effect, in the working of a TE device, makes it important to have a clear picture of how the temperature-dependent properties of the TE material namely, thermal conductivity( $k$ ), Seebeck coefficient( $S$ ) and electrical resistivity( $\rho$ ), affect the temperature profile along the length of the module. In this article, we evaluate the performance of two TE devices by determining their efficiency and the power produced, which are evaluated using the temperature profile, on the MATLAB computing software. The Temperature-dependent material properties of two TE materials have been taken into account. The same model can then be used to determine and compare the effect of temperature-dependent material properties on the performance of other TE materials.

**Keywords:** Thermoelectric materials; Temperature dependent properties; temperature profile; MATLAB; Performance

