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Infrared power generation in an insulated environment YOSYP SCHWAB, HARKIRAT MANN, BRIAN LANG, James Madison University, JARRETT LANCASTER, University of North Carolina at Greensboro, RONALD PARISE, Parise Research Technologies, ANITA VINCENT-JOHNSON, GIOVANNA SCAREL, James Madison University — Alternative energy sources are an increasingly popular field of research, in particular energy harvesting through solar radiation, focusing on infrared (IR) radiation. Exploitation of readily available thermal energy is particularly interesting due to possible widespread applications. This work examines the behavior of thermoelectric devices exposed to infrared radiation in a controlled environment. Thermoelectric power generators work according to the Seebeck effect, where the temperature difference ΔV induced between the two junctions is linearly proportional to the voltage difference ΔT across the two contacts. Our experimental results show [1] that heat and radiation do not activate the same mechanisms in the thermoelectric power generator. Analysis and simulation further support the distinction between the IR and heat power generation. In particular, ΔT and ΔV have a linear and exponential behavior versus time with heat and IR, respectively. Our work is of significant importance for designing IR sensors, detectors, and radiation harvesting devices.

[1] Y. Schwab, H. S. Mann, B. N. Lang, J. L. Lancaster, R. J. Parise, A. J. Vincent-Johnson, and G. Scarel, "Infrared power generation in an insulated compartment," Complexity, in press (2013).

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