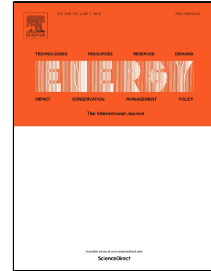


Accepted Manuscript

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PII: S0360-5442(18)30935-6
DOI: 10.1016/j.energy.2018.05.109
Reference: EGY 12944
To appear in: *Energy*
Received Date: 15 October 2017
Accepted Date: 16 May 2018

Please cite this article as: S. Ahmadi Atouei, A. Rezania, A.A. Ranjbar, L.A. Rosendahl, Protection and Thermal Management of Thermoelectric Generator System Using Phase Change Materials: An Experimental Investigation, *Energy* (2018), doi: 10.1016/j.energy.2018.05.109

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Protection and Thermal Management of Thermoelectric Generator System Using Phase Change Materials: An Experimental Investigation

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Abstract

In most thermoelectric systems the thermal boundary conditions are transient, and thermal management of the system is critical to improve electrical performance of the system. In this study, effect of using phase change materials (PCM) to control the hot and cold side temperatures of a thermoelectric generator (TEG) module is investigated experimentally. In order to have a comprehensive investigation, two aluminum boxes are fabricated and filled by three types of PCM. The boxes are applied on the hot side, cold side and both sides of the TEG module in three configurations. The effect of using PCM box at different locations of the system is compared to a common TEG system without the PCM. The results show that, applying PCM box on the hot side of the TEG module not only causes that the module generates voltage for longer time after removing the external heat source, it furthermore protects the module from failure due to high input thermal power. The results indicate that using PCM box as heat sink is worthy in order to enhance the net power generation, because in this case, the PCM heat sink does not need any cooling energy.

Keywords: Thermoelectric generator, Phase change material, Thermal management, Experimental investigation

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