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”TEG-BASED COOLING SYSTEM: A PROMISING ADVANCEMENT IN MATERIALS AND RAPID  
PROTOTYPING FOR SPACESUITS”

**Abstract**

The design and implementation of a novel cooling system for a spacesuit utilizing thermoelectric generators (TEGs) are presented in this paper. The thermal regulation materials in the suit construction have been enhanced to include TEG modules, which can both manage the temperature of the spacesuit and provide extra power for external purposes. The TEGs work by converting the temperature difference between the inside and outside of the suit into usable electrical energy, which can then be used to power electronic devices or other equipment.

To test the effectiveness of the TEG-based cooling system, a prototype spacesuit was constructed and subjected to thermal testing in a thermally controlled environment. The results showed that the TEGs were able to effectively regulate the temperature of the spacesuit, even under extreme temperature conditions. Additionally, the TEGs were able to generate a significant amount of power, which could be used to extend the life of the spacesuit’s batteries or power external devices.

The design of the TEG-based cooling system is discussed in detail, including the materials used, the layout of the TEG modules, and the control system used to regulate the suit’s temperature. The potential applications of this technology are also discussed, including its use in other types of protective clothing, such as hazmat suits or firefighting gear.

Overall, the results of this study demonstrate the feasibility and potential benefits of using TEGs to regulate the temperature and provide power for spacesuits and other protective clothing. This technology has the potential to improve the safety and effectiveness of individuals working in extreme environments.