Low Heat Flux Woven Thermoelectric Generators with Semiconductor Strings

A flexible, high internal thermal resistance woven thermoelectric generator maximizes power output for low heat flux sources, offering faster production and increased efficiency for applications like human body heat recovery.

Thermoelectric generators can be utilized for a wide variety of applications, such as human body heat recovery. Unfortunately, human skin provides a significantly low heat flux, requiring thicker thermoelectric elements. For ideal performance, this thickness needs to be larger than half a centimeter, which cannot fit the three dimensional form of the body. In order to produce an applicable human body module, the flexibility of the material, its thickness, and the temperature difference need to be controlled.

By optimizing these factors, researchers at Purdue University have developed a low heat flux woven thermoelectric generator for application in human body heat recovery. This module utilizes woven semiconductor strings in a repeating MPMN structure. This metal structure generates a high internal thermal resistance that functions better with low heat flux sources, maximizing power output by a difference of three-fold compared to conventional modules. In addition, the semiconductor strings can be produced significantly faster than other materials, and pin-fins can be used to increase the passive heat transfer, fully optimizing the module.

Advantages:

-High internal thermal resistance

-Faster production

-Flexible

-Increased power output

Potential Applications:

-Human body heat recovery

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Category

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