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Thermoelectricity: Principles and Applications

Thermoelectricity is the direct conversion of thermal energy into electrical energy (denoted as thermoelectric generator TEG) and vice versa (denoted as thermoelectric cooler TEC). Therefore, thermoelectrics is literally associated with thermal and electrical phenomena. The main advantages of TEG's and TEC's are their noiseless operation, no moving parts and no working fluids. In this presentation, we will give an overview of the physical principles of thermoelectricity, the existing state of research and the performance parameters of thermoelectric materials as well as examples of the wide range of applications of thermoelectric modules (e.g. waste heat recovery, generation of electric power in remote area, solar TEG, space flight, medicine, etc.).

Recent Publications:

1. Zevalkink A, Smiadak D M, Blackburn J L, Ferguson A J, Chabinyc O D, et al. (2018) A practical field guide the thermoelectrics: Fundamentals, synthesis and characterization. Appl. Phys. Rev. 5:1–50.
2. Elsheikh M H, Shnawah D A, Sabri M F M, Said S B M, Hassan M H, et al. (2014) A review on thermoelectric renewable energy: principle parameters that affect their performance. Renew Sust. Energy Rev. 30:337–355.
3. Champier D (2017) Thermoelectric generators: a review of applications. Energy Convers Manage 140:167–181.

Biography

Karl-Heinz Gresslehner is a Professor at University of Applied Sciences, Austria. His research interests are theoretical semiconductor physics and electrodynamics.

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