University System of Maryland
LSAMP
Louis Stokes Alliance for Minority Participation
2021 RESEARCH SYMPOSIUM

IDEAL THERMOELECTRIC MATERIAL FOR COMMERCIAL APPLICATION

Jarod Mendoza-Tingem[1], Priyanshu, Banjeree[2]
[1]Department of Mechanical Engineering, University of Maryland Baltimore County, 1000 Hilltop Circle, Baltimore, MD 20785

A thermoelectric material has the ability to convert heat into electrical energy and vice versa. Thermoelectric materials can be used to harvest waste thermal energy in cars, for example. Our research question focused on synthesizing a material that most effectively converts thermal energy. We quantified the effectiveness of the given material film by measuring the Seebeck coefficient. The Seebeck coefficient is the ratio of voltage change to temperature change. The films synthesized were different combinations of Bismuth, Selenium, Tellurium, and Tetrahedrite.

The process for creating the films used for testing was utilizing a screenprinter to press the metal mixture and a neutral chitosan liquid mixture onto a Kevlar substrate. After pressing the films in the screenprinter they were put in the oven in order to be stick onto the Kevlar. The thickness, bulk concentration, conductivity, and mobility of the synthesized films were also measured.

In the future, we hope to find the ideal film that will create the highest Seebeck coefficient. The application of our discovery will have many real-world applications. The films can be used to improve the performance of flexible electronics. We synthesize and characterize composite thermoelectrics, and improve their performance using appropriate additives and materials processing techniques