

Thermoelectric property of bismuth telluride filled silicone processed under high-voltage electric field

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Abstract— Using electrospinning, bismuth telluride filled silicone composite was made into wires under high-voltage electric field. The final composite products are millimeter sized wires. The composite wires were tested in view of the electrical resistance and Seebeck coefficient. The highest electrical resistance measured is 2.9×10^{10} ohms. The composite material exhibits Seebeck effect. By further improvement on the energy conversion efficiency, it is possible for making a flexible thermoelectric material for alternative energy applications. It is predicted that although the electrical resistance is increased by using silicone rubber matrix, the thermal conductivity could be reduced as a result of an increase in phonon scatters. Hence, there is a compromise between the electrical resistance and the thermal conductivity when choosing silicone rubber as the matrix. As a result, the thermoelectric property of the composite material is increased significantly compared with the bulk reference material.