

# Synthesis of Nano Carbon Material Thermoelectric Film based on Polymer for Waste Heat collection

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## Abstract

Thermoelectric generation is no moving parts in producing electric power. These characteristics have the advantages of no wear of parts, low noise level, high reliability, and low maintenance cost. However, low efficiency is known to be the biggest disadvantage, and efforts are under way to improve efficiency through various studies. Bi-Te type metal compounds using bismuth (Bi) and tellurium (Te) are used as typical thermoelectric materials. In addition, solid thermoelectric materials have high thermoelectric efficiency using various materials. However, inorganic solid materials are scarce and expensive, and also, they are chemically weak in durability and weak in mechanical strength. Therefore, it is easily broken and has many limitations in application to various application fields.

In this paper, to overcome limitations of solid state thermoelectric materials, we have developed a polymer based nano carbon material thermoelectric film using a conductive polymer and a carbon nanotube (CNT). The voltage generated by applying the temperature difference to the thermoelectric film was measured, and the electric conductivity was measured to confirm smooth charge.

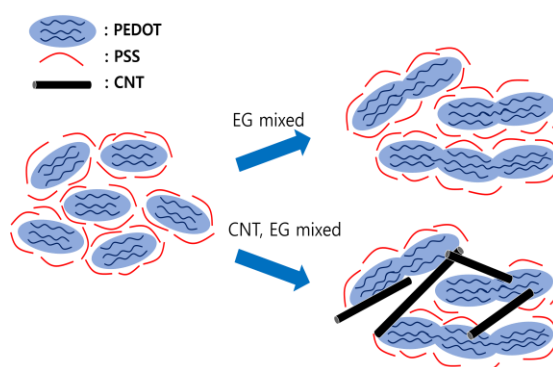
The manufactured thermoelectric film is flexible and can be mass-produced in a large area, is inexpensive, and can be

operated in a low temperature region. Through these advantages, the possibility of overcoming limitations in existing thermoelectric materials is suggested.

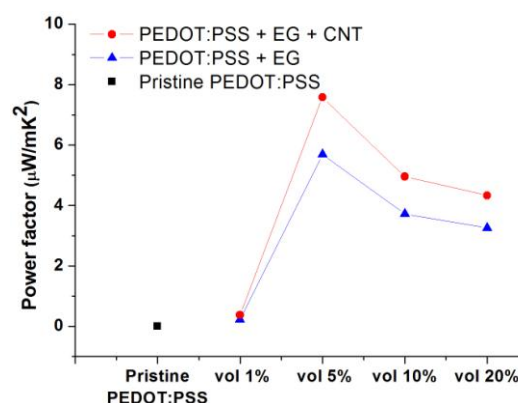
## References

- [1] Dasaroyong Kim, Yeonseok Kim, Kyungwho Choi, Jaime C. Grunlan, and Choongho Yu. ACS Nano. 4, 513-523 (2010).

## Figures



**Figure 1:** Schematic image for structural difference of PEDOT:PSS by EG and CNT



**Figure 2:** Power factor graph of thermoelectric film composed of PEDOT:PSS, EG and CNT