Investigation of the Thermoelectric Properties of Paper-based Flexible Devices with 2D Materials

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In the last years, the interest on wearable devices has triggered a surge of research on clean and maintenance-free ways to power up these devices. Thermoelectric materials can directly convert thermal energy into electrical energy; therefore, they can be used to scavenge energy from human body temperature or thermal waste from other electronic devices [1-3]. Layered two-dimensional (2D) materials have attracted considerable attention as efficient thermoelectric materials due to their unique electronic, mechanical, thermal, and optoelectronic properties [4-6].
Herein, we were interested in characterizing the thermoelectric properties of films of 2D materials deposited on standard office paper for their future use as low-cost biodegradable devices in disposable electronics applications. We determined the Seebeck coefficient of films of different semiconducting 2D materials, both P type and N type, and we demonstrated the fabrication of a Peltier cell with P-N junctions in series with enhanced thermopower. This work by drawing 2D materials on paper offers a promising strategy for future low-cost, flexible, and simple fabrication thermoelectric device applications.

References

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