

Graphene-based energy devices enable the battery-free wireless wearable electronics

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Research and development in the field of wearable electronics have been quickly growing from recent years, trying to answer the increasingly demanding request of consumers towards communication, networking, positioning and recognition technologies in compact and portable forms. However, one of the most critical obstacle for entering the market is the power supply. Typically, such systems are powered by primary or rechargeable batteries with numerous drawbacks, including sustainability, safety, complicated logistics (ever-increasing safety rules issued by IATA) and inconvenient charging procedure for users, as rechargeable batteries need too much time and must be connected to a charging device.

Within spearhead project WearGraph[1] (funded by Graphene Flagship), flexible graphene-based energy generators (solar cell and NFC antenna), communication device (NFC antenna) and energy storage devices (supercapacitors [2]) have been developed and integrated into a wireless self-powered wearable electronic system (**Figure 1a**) to address the aforementioned issues towards commercialization of wearable electronics.

This system has been integrated into thermo-regulator Jacket with e-cooline@[3] technology to maintain and cool down the body temperature in hot environment (**Figure 1b**). Within the developed technology, the solar cell and NFC antenna will generate energy which will be stored in supercapacitor wirelessly. The supercapacitor will charge the temperature sensors in less than a minute to show the jacket and body temperature. Temperature values will transfer wireless via antenna to a mobile app.

References

[1] <https://graphene-flagship.eu/project/spearhead/Pages/WearGRAPH.aspx>

[2] Zhang, P.; Wang, F.; Yu, M.; Zhuang, X.; Feng, X., *Chem. Soc. Rev.* **2018**, 47 (19), 7426-7451.

[3] <https://www.e-cooline.com/>

Figures

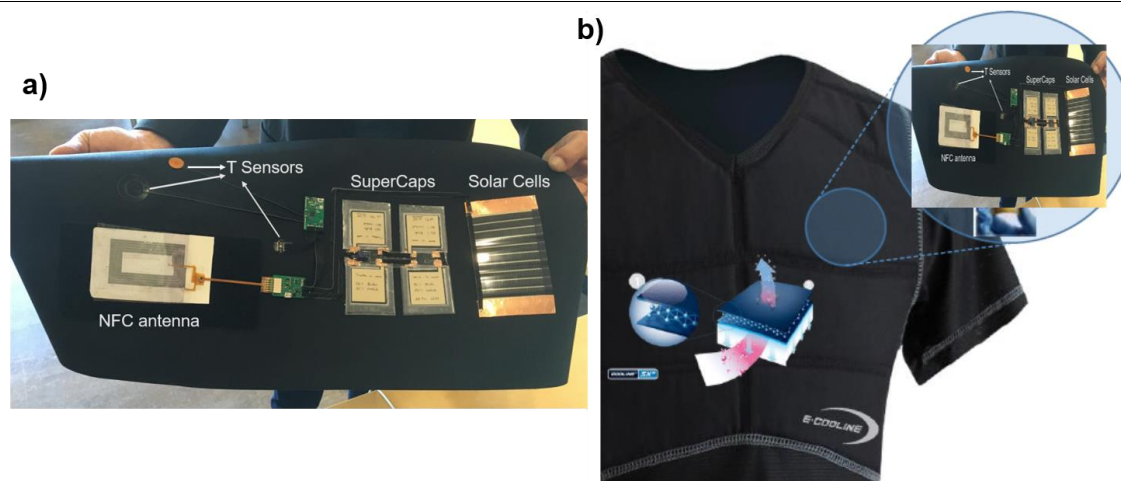


Figure 1: a) Graphene-based self-powered wireless wearable electronic system and b) its integration into thermo-regulator Jacket with e-cooline@ technology