Laser-assisted graphene electrodes for smart textiles: From energy harvesting to miniaturized energy storage.

Natalia Kantouni [1,2,#], Athinais Mavrikaki [1,2], Markos Anagnostakos [1], Kapil Bhorkar [1], Nikolaos Samartzis[1], Michail Athanasiou [1] and Spyros N. Yannopoulos [1,2#*]

[1] Foundation for Research and Technology Hellas, Institute of Chemical Engineering Sciences (FORTH/ICE-HT), Patras, GR-26504, Greece

[2] Department of Chemistry, University of Patras, Patras, GR-26504, Greece

Presenting author: Natalia Kantouni. * Corresponding author: Spyros Yannopoulos, email: sny@iceht.forth.gr

ABSTRACT

Harvesting and storage are two critical energy-related processes that have been thoroughly explored over the last decades. At small scales of energy demand, an efficient combination of harvesting and conversion can lead to autonomous self-powered units. These units will drive the development of battery-less technology for future systems, including wearable electronic devices, as well as medical, sports, well-being and Internet of Things (IoT) applications.

Over the past decade, the advent of triboelectric nanogenerators (TENGs), devices that couple triboelectricity with electrostatic induction to convert mechanical energy into electricity, has marked a significant breakthrough in the field of energy harvesting.[1] TENG-powered wearable devices can exploit the *in-situ* conversion of body-induced (biomechanical) and other sources of mechanical energy, into electricity. TENG is the optimal technology for the development of self-powered smart clothing, capable of harvesting and storing energy in micro-flexible supercapacitors (SCs).

This study presents a one-step, laser-assisted approach for the synthesis, processing, functionalization, and simultaneous integration of graphene-based materials and graphene nanohybrids directly into energy-harvesting TENGs and micro-flexible interdigitated SCs.[2] This method offers a viable alternative to conventional production techniques, facilitating the use of such devices in smart textiles applications.

REFERENCES

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Acknowledgments

This work is supported by the European Union, under Horizon Europe Programme GRAPHERGIA (Grant Agreement n.101120832).