Laser Induced Graphene Flexible In-Plane Microsupercapacitors

J Marti-Gonzalez [1,2]
E. Bertran-Serra [1,2], P. Papakonstantinou [3]

[1]ENPHOCAMAT (FEMAN) Group, Dep. Applied Physics, Universitat de Barcelona, C/ Martí i Franquès, 1, 08028 Barcelona
[2]Institute of Nanoscience and Nanotechnology (IN2UB), Universitat de Barcelona
[3]NIBEC, University of Ulster, Shore Road, Belfast BT37 0QB, Northern Ireland, UK

jmartigonzalez@ub.edu

The continuous miniaturization of electronics and energy storage devices are facilitating the increase of wearable devices and sensors. Flexible micro-supercapacitors (MSCs) are a promising and low cost power source for this devices, because compared with microbatteries, which are the used solution nowadays, MSCs presents faster charge/discharge rate, higher power density and higher cyclability [1]. In this study, a flexible, in-plane micro-supercapacitor with interdigitated electrodes has been fabricated. A commercial polyimide film has been used as the substrate, and converted to laser induced graphene (LIG) by direct laser irradiation with a CO_2 infrared laser. This LIG is a porous 3D material that exhibits high surface area, high thermal and chemical stability and good conductivity [2], so it presents huge potential for electrochemical and energy storage applications. In order to improve the capacitance of the device, cobalt based nanostructures have been deposited onto the LIG by electrochemical deposition. Finally, in order to avoid costly encapsulation processes and possible leakages, a solid gel electrolyte have been used.

References

[1] Li, L., et al. Advanced Materials, 2016. v. 28, p. 838-845.
[2] Ye, R., James, D.K. and Tour, J.M. Advanced Materials, 2019, v. 31, 1803621

Figures

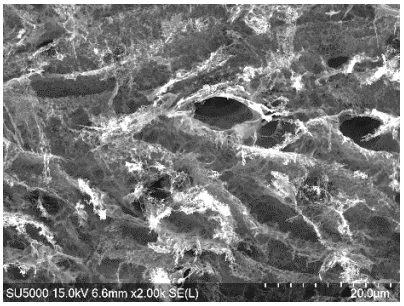

Figure 1. SEM image of the obtained Laser Induced Graphene.

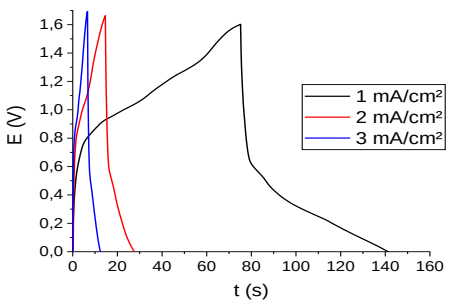

Figure 2. CC curves of LIG-MSCs at different current densities.