Sensitive Piezoresistive sensors made of Graphene-based 3D ordered porous structures for wearable electronic

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Recent years have shown significant progress in developing stretchable electrodes, which remain the fundamental building block in flexible and wearable electronic devices [1]. The excellent properties of graphene have made it the best candidate for the next generation of flexible electronics applications. Wearable sensors require several properties such as high flexibility, stretchability, lightweight, and inexpensive fabrication, and they have to be suitable for integration with electrical components. One solution is the combination of nanostructures that act as sensors and polymers that guarantee the flexibility of the device. Different methods have been proposed in the literature to achieve these essential properties [2]. However, all techniques develop a flexible sensor that is all covered by the polymer, so a lighter structure is needed. In order to achieve this goal, here we present a device in which the 3D structure of PDMS is covered by a layer of graphene grown by the CVD method, as shown in figure 1a.
The variation of electrical resistance gives the piezoresistive effect of these devices, so the electrical sheet resistance of the foam was measured, figure 1b. These devices show great potential as wearable multi-sensor devices to detect human-body signals. In this presentation, the optimised methodology to produce these materials will be presented and preliminary results discussed.

References

[1] Yonghee Kim et al., Macromolecular Research 27.7, (2019), pp. 625639
[2] Yu Pang et al, ACS Appl. Mater. Interfaces, (2016)

Figures

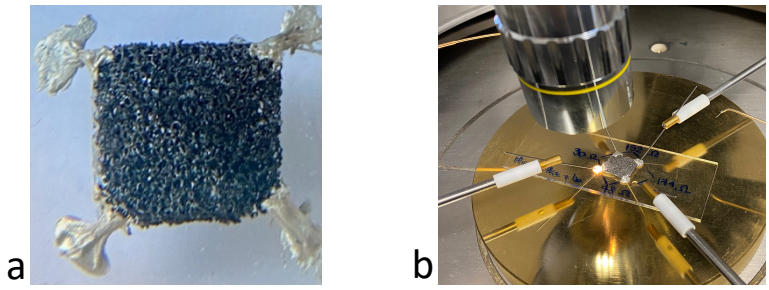

Figure 1: (a) 3D Graphene/PDMS foam contacted with silver paste. (b) Electrical measurement of 3D graphene/PDMS foam