

Piezoresistive Flexible Elastomeric Foams Coated with Graphene-Polymer Nanocomposite Film

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In the last years the demand of new generation flexible wearable sensors has attracted a significant interest from different research groups.

Recently, we described the fabrication process and the performance as pressure sensors of new polydimethylsiloxane (PDMS) foams loaded with multilayer graphene nanoplatelets (MLGs) [1]. We also investigated the response of strain sensors made of a Polyurethane foam coated with a Polyvinyl alcohol (PVA) - MLGs paint [2].

Our present research is focused on the development of new piezoresistive porous materials with improved sensitivity using different elastomeric, biocompatible soft foams and graphene-based coatings [3]. As an example, we report the morphological analysis, the mechanical response and the resistance variation under a compressive stress of new PDMS open-cells structures coated with a PVA/MLGs based paint.

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References

- [1] A. Rinaldi, A. Tamburrano, M. Fortunato, and M. S. Sarto, *Sensors* 2016, 16, 2148.
- [2] A. Rinaldi, A. Proietti, A. Tamburrano, and M. S. Sarto, *Proceedings of IEEE Sensors*, (2017)art. no. 7808737.

- [3] M. S. Sarto, A. Tamburrano, A. Proietti, A. Rinaldi, L. Paliotta, Patent 2016 WO2016207804A1

Figures

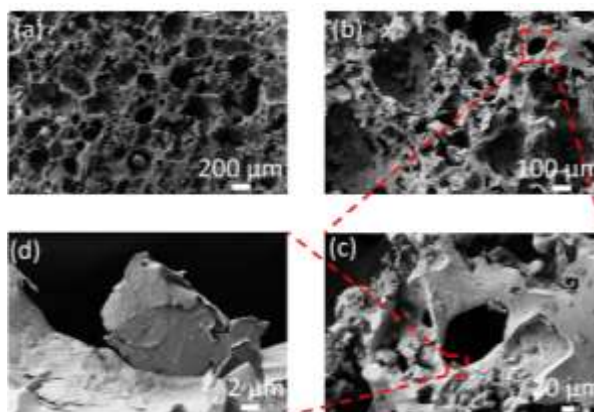


Figure 1: SEM images of different foams cross-sections: (a) PDMS foam; (b) PVA/MLGs coated PDMS foam; (c), (d) higher magnifications of the area marked in (b).

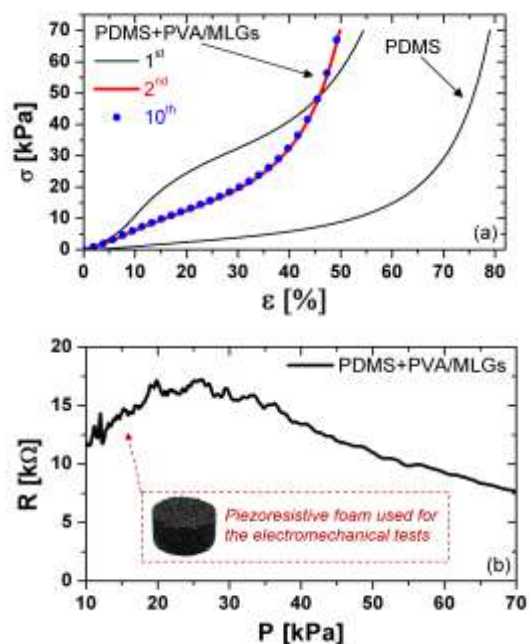


Figure 2: stress (σ)-strain (ϵ) response of PDMS and PDMS+PVA/MLGs foams (a); resistance variation of a piezoresistive PDMS+PVA/MLGs (b).

foam due to the applied compression between
10-70 kPa (b).
