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BOOK OF ABSTRACTS

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CHARACTERIZATION OF POLY(DIMETHYLSILOXANE)/LASER-INDUCED GRAPHENE COMPOSITES

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Abstract

Laser-induced graphene (LIG) is one of the most promising graphene-based materials for the fabrication of flexible electronic devices. However, despite huge efforts to develop LIG on new substrates there is a lack of stretchable polymers convenient for laser graphenization. Poly(dimethylsiloxane) is elastomer suitable for flexible electronic fabrication due to excellent flexibility, optical transparency, hydrophobicity, UV-resistance and good thermal and oxidative stability. Unfortunately, PDMS cannot be easily graphenized by direct laser writing because of the low amount of carbon linked to the siloxane chains, mainly consisting of methyl groups. In this study, a series of PDMS/Triton materials with different concentrations of Triton (1-30 wt.%) was prepared by casted-based approach starting from divinyl-terminated-PDMS and poly(methyl-hydrogensiloxane). Furthermore, direct laser graphenization of PDMS/Triton materials is proposed for the first time. Different laser parameters and multiple writing steps have been examined in order to induce a graphene-like structure on PDMS/Triton and to increase as much as possible its conductivity. The prepared PDMS/Triton/graphene composites were characterized by Raman spectroscopy, scanning electron microscopy (SEM) and sheet resistance measurements. The results revealed that by adding Triton it is possible to enhance the graphenization degree. The obtained PDMS/Triton/graphene composites are suitable candidates for flexible microsupercapacitor fabrication.

Keywords: poly(dimethylsiloxane), graphene, composites, laser, sheet resistance.

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