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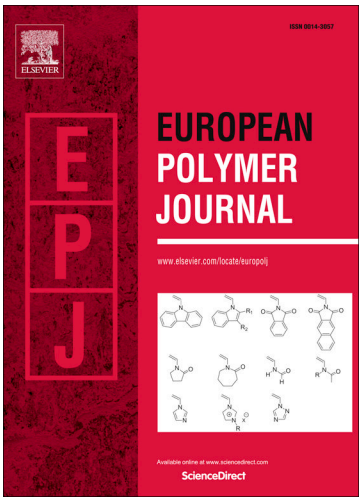

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Flexible and Recyclable Conductive composite Based on Few-Layered Graphene with Excellent Self-healing Capability

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ABSTRACT

Flexible and self-healing conductive materials are highly desired in the development of soft electronics due to their wide applications. Here we report the preparation of a flexible and self-healing conductive composite by simply blending few-layered graphene with poly(dimethylsiloxane)-containing urea segmented copolymer (PDMS-urea) using THF as solvent. The obtained composite materials show excellent electrical conductivity and self-healing capability. The relationship between the conductivity of the composite film and the graphene weight ratio was investigated and the conductivity of composite containing 12 wt% graphene reaches 81.5 S/m. Based on the balanced flexibility and conductivity, the solvent vapor-induced self-healing and material recyclability studies were performed on a 10 wt% graphene doped composite. The severed sample can be readily healed by exposing it to THF vapor at room temperature and the recovery of electrical conductivity comes up to around 95 %. Due to the excellent self-healing capability, the composite film cut into tiny pieces can be recycled assisted by THF vapor with only slightly losing its electrical conductivity.

Keywords: self-healing; flexibility; conductive composites; graphene; PDMS-urea