

Direct laser writing of graphene patterns on flexible films under ambient conditions

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Abstract

The shape and size of graphene crucially influence the performances of graphene devices, thus an important research direction emerges, of fabricating high-quality graphene with sound patterns. However, the existing methods are time-consuming and costly with several transfer steps, and there are even no adequate researches of direct fabricating graphene patterns on insulated substrates, especially flexible substrates. This research presents a method for rapid fabricating and patterning graphene in one step on insulated flexible substrates. Nanosecond ultraviolet laser is used to direct write and reduce graphene oxide to graphene in one step under ambient conditions. The effect of processing parameters (including laser power, scan speed, defocus and scan times) on the resolution and reduction degree of fabricated graphene patterns was systematically studied. Various graphene patterns, including line arrays, spirals and texts were fabricated. A simple and cost-effective method to rapid fabricate arbitrary graphene patterns was proposed in the research, boasting huge prospect for fabricating flexible graphene functional devices.