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# Enhanced Electrothermal Efficiency of Flexible Graphene Fabric Joule Heaters with the Aid of Graphene Oxide

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## Abstract

Flexible fabric Joule heaters reflect a broad prospect due to their wearable substrate, low cost and easily compatibility to garment. In this paper, graphene-based fabric Joule heaters were fabricated with spraying coating method, the as-prepared fabrics possessed bilayer structure corresponding to the inner graphene/polyurethane layer and the outer graphene oxide layer respectively. The morphology and electrothermal performance of the fabric Joule heaters were accomplished by scanning electron microscopy and infrared camera. The outer graphene oxide could dramatically promote the electrothermal efficiency of the fabric Joule heaters with the steady-state temperature (162.6 °C) and the maximum heating rate (8.4 °C/s) under 10 V applied voltage, which was much higher than the heaters without GO layer with the steady-state temperature 70.1 °C and the

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