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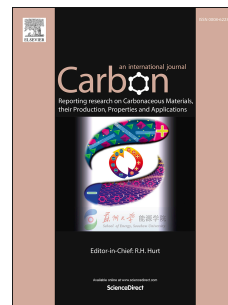
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Graphene bi- and trilayers produced by a novel aqueous arc discharge process

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Abstract

Production of large quantities of graphene sheets with less than 10 layers is extremely difficult due to the lack of a controllable process and method to separate multilayered graphene. Here, we demonstrate a controllable and scalable aqueous arc discharge process that produces high quality bi- and trilayers of graphene. With this process, the number of stacked graphene layers is controlled by adjusting the arc discharge power, which maintains the interlayer distance at ~ 0.34 nm for each level of arc discharge power. The graphene sheets are produced by exfoliation of the graphite electrodes, as opposed to evaporation of carbon molecules from the graphite. Finally, transparent electrode properties were demonstrated when the exfoliated graphene-based electrodes were transferred to a flexible substrate with high transparency (84.5% at 550 cm^{-1}) and low resistance ($27.7\text{ k}\Omega\text{ cm}^{-2}$).

Keywords: graphene, bi- and trilayer, aqueous arc discharge, exfoliation, transparent electrodes

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