Local Anodic Oxidation of Graphene Using Atomic Force Microscope and its Effect on Electrical Properties.

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Abstract

Graphene has generated great interest since its discovery in 2004 due to its unusual and potentially useful electrical, chemical, mechanical, and optoelectronic properties. However, a major challenge in graphene research is to develop reliable and facile methods for tuning its properties for applications in electronics, optics, and sensing. In particular, numerous approaches for adjusting the electrical properties of graphene have been investigated, including electrical gating, size constriction, and the generation of defect states.

In this study, we have formed graphene oxide (GO) lines with different widths on exfoliated graphene under different conditions by using atomic force microscope (AFM) lithography.[1] Local current and friction force images were obtained between adjacent two gold contacts using AFM before and after formation of a GO line which separated the graphene into two parts. Such functionalization with oxygen-containing groups has been demonstrated to be an effective method for changing the chemical potential or even opening a band gap.[2] Furthermore, the tunneling effect of the G/GO/G junction was observed in GO line with a few tens of nanometers width.[3]

References

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Figures