Study of Cross-plane Electrical Conductivity of Graphene-based Heterostructure by Atomic Force Microscopy

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Abstract

Designing thermoelectric (TE) structures by 2D-materials has been discussed for a long time. The graphene-based cross-plane thermoelectric (XPTE) heterostructures have great potential to achieve high figure of merit ZT due to its low cross-plane (XP) thermal conductivity. However, the cross-plane electricity hasn't been investigated so far, which is crucial for designing a new potential TE heterostructure. Herein, we experimentally demonstrate the XP current distribution of graphene/C_{60}-cluster heterostructure by conducting AFM technology (Bruker Dimension ICON, PeakForce TUNA). The results show that the current tends to distribute around graphene/C_{60}-cluster instead of blank area of graphene at low DC sample bias. After increasing applied voltage, the current tends to concentrate on graphene wrinkles rather than graphene/C_{60}-cluster positions. These facts reveal that the XP electrical conductivity could be enhanced by the usage of intercalated C_{60} clusters and hence improve the XPTE properties.

References

[1] Authors, Journal, **Issue** (Year) page.

Figures