

Cross-plane Thermoelectric Effect of Graphene-based Nanostructure

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Abstract

The cross-plane thermoelectric (XPTE) nanostructure was fabricated by few-layer graphene and intercalated C_{60} clusters. The effective thermoelectric figure of merit (ZT) of this all-carbon sandwich nanostructure in cross-plane direction was measured by transient Harman's method. The results of ZT value has great potential to compete with nowadays commercial TE materials. A suggested mechanism for XPTE nanostructure implies the ZT could be further pushed to higher value, and reveals the high temperature-to-electricity conversion efficiency at a wide temperature range. In addition, due to graphene is an atomic thick 2D material with high transparency and flexibility, a transparent and flexible TE device of graphene-based nanostructure is demonstrated herein.