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Title:Ultrahigh speed graphene diode with reversible polarity

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Abstract:The ability to tune the carrier-type concentration ratio with applied field along with a mean-free path length approaching $1 \mu\text{m}$ in graphene enables a new diode in which the diode polarity can be reversed. The diode consists of a thin graphene film with a geometric asymmetry that determines a preferred direction for charge-carrier transport, independent of whether the carriers are electrons or holes. We fabricated submicron geometric diodes by patterning and etching exfoliated graphene. Applying field-effect voltages to the substrate, we reversed the carrier type and demonstrated reversal of the diode polarity. The graphene geometric diodes exhibited rectification at 28 THz, opening the way to ultrahigh speed applications for these versatile devices. © 2012 Elsevier Ltd.

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