Radio-Frequency Graphene Field-Effect Transistors Based on Millimeter-Scale Graphene Domain

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Abstract
Graphene is a promising candidate in radio-frequency (RF) applications due to its ultrahigh carrier mobility [1] and tolerance to large current density [2]. Several advanced techniques have been exploited in fabricating graphene field-effect transistor (FET) involving reduction of access resistance, gate capacitance, output conductance [3], contact resistance [4] and enhancement of insulating layer quality [5], seeking for high cut-off frequency (fT) and maximum oscillation frequency (fmax). Here, we present high-performance top-gated RF FETs using a millimeter-scale graphene domain with a conventional fabrication process. A maximum fT of 178 GHz and a peak fmax of 35 GHz are achieved in the graphene-domain-based FET with a gate length of 50 nm and 150 nm, respectively. This work shows that the millimeter-scale single graphene domain has great potential in RF devices and circuits.

References