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Local Ambipolar Graphene Field Effect Transistors via Metal Side Gates JIFA TIAN, LUIS JAUREGUI, GABRIEL LOPEZ, HELIN CAO, YONG CHEN, DEPARTMENT OF PHYSICS, PURDUE UNIVERSITY, WEST LAFAYETTE, INDIANA 47907 TEAM, BIRCK NANOTECHNOLOGY CENTER, PURDUE UNIVERSITY, WEST LAFAYETTE, INDIANA 47907 TEAM, SCHOOL OF ELECTRICAL AND COMPUTER ENGINEERING, PURDUE UNIVERSITY, WEST LAFAYETTE, INDIANA 47907 TEAM — We fabricated local graphene field effect transistors (FET) based on metal side gates. The characteristic ambipolar field effect of graphene device was observed by sweeping only the voltage of a local metal side gate. The local charge neutrality point of the side-gate graphene FET can be tuned in a large voltage range from positive to negative by a second side gate. Furthermore, we observed that the field effect due to the side gate can be appreciably weakened by electrically grounding the back gate compared to floating the back gate. The experimental results can be well explained by electrostatic simulation using COMSOL. Our technique offers a simple method for local tuning of charge density of graphene nanodevices while avoiding coating graphene surface with dielectrics, which may cause contamination and degradation of graphene.

Jifa Tian

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