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Doping Level Dependence of Transfer Characteristic of n-type Graphene Nanoribbon Field Effect Transistors LU WANG, RUI QIN, JING ZHOU, HONG LI, JIAXIN ZHENG, JING LU, State Key Laboratory for Mesoscopic Physics and Department of Physics, Peking University, Beijing 100871, P. R. China, WAI-NING MEI, Department of Physics, University of Nebraska at Omaha, Omaha, Nebraska 68182-0266, SHIGERU NAGASE, Department of Theoretical and Computational Molecular Science, Institute for Molecular Science, Okazaki 444-8585, Japan — By performing first principles calculations and electron transport simulations, we demonstrate that the transfer curves of graphene nanoribbon field effect transistors can be controlled by changing the concentration of potassium atoms and cobaltocene molecules doping, or nanoribbon edge carbon atoms substitution by nitrogen. We reveal that Dirac point shift downward from 0 to -12 V when the impurity concentration increase from 0 to 1.37%, while the transfer curves maintain bipolar characteristics with reasonably high on/off ratios. Moreover, we observed strong charge transfer from the adsorbed atoms and molecules that facilitates n-type characteristics in graphene nanoribbons. Thus, we suggest that an effective way to achieve tunable n-type graphene nanoribbons field effects transistors is to dope them with electron donors.

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