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Influence of Metal Contact on the Operation and Scalability of Graphene Field-Effect-Transistors PEI ZHAO, University of Notre Dame, QIN ZHANG, CMOS and Novel Devices Group, National Institute of Standards and Technology, DEBDEEP JENA, University of Notre Dame, SIYURANGA O. KOSWATTA, IBM Research Division, T. J. Watson Research Center — We explore the effects of metal contacts on the operation and scalability of 2D Graphene Field-Effect-Transistors (GFETs) using detailed numerical device simulations based on the non-equilibrium Green's function formalism at the ballistic limit. Our treatment of metal/graphene (M/G) contacts captures: (1) the doping effect due to the shift of the Fermi level in graphene contacts, (2) the density-of-states (DOS) broadening effect inside the graphene contacts, and (3) the Metal-Induced-States inside the graphene channel. Our results confirm the asymmetric transfer characteristics in GFETs due to the doping effect by metal contacts. Furthermore, the DOS broadening effect will increases the on-current at higher M/G coupling strengths. Finally, with scaling of the channel length, influence on the minimum current in the off-state is also discussed.

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