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Investigation of Molecular Functionalizing Agents for Graphene Device Optimization. DAMON FARMER, IBM, YU-MING LIN, ALI AFZALI-ARDAKANI, PHAEDON AVOURIS — Due to its linear dispersion relation and the predicted chiral nature of its quasiparticles, graphene has become a material of intense experimental and theoretical investigation. There has been rapid progress in the fabrication and understanding of graphene devices. However, many key issues still need to be addressed in order to fully exploit graphene for technological applications. Here, we identify stable molecular compounds that can be used as dopants and functionalizing agents on graphene. As dopants, these compounds are used to both modify the potential profile in the channel region of graphene devices, and reduce parasitic resistances in these devices. As functionalizing agents, these compounds serve as nucleation sites for the uniform growth of thin high-κ gate dielectrics, allowing for enhanced capacitive coupling with the graphene channel. The characteristics of graphene devices employing these molecular compounds will be presented, and problems associated with the implementation of these molecules in graphene devices will be discussed.

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