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**Current-Voltage Characteristics of Electrolyte-Gated  
Graphene Field-Effect Transistors<sup>1</sup>**

INANC MERIC, SEBASTIAN SORGENFREI, MELINDA HAN, BARBAROS OEZYILMAZ, PHILIP KIM, KENNETH SHEPARD, Columbia University — We investigate the current-voltage characteristics of graphene field-effect transistors (FET) with ionic-solution gating. Single-layer graphene FETs are fabricated with different device dimensions and electrolytically gated with a potentiostat in which a Pt counter electrode and an Ag/AgCl reference electrode in a feedback configuration hold the solution at a desired potential. This setup enables the gating of graphene with high efficiency due to the short Debye length and high dielectric constant in ionic solutions, leading to enhanced measured transconductances. Electrolytic gating has direct applicability to field-effect sensor applications of graphene devices.

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