Abstract Submitted
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Mechanism for energy dissipation and current saturation in graphene transistors ASHLEY DASILVA, KE ZOU, JAINENDRA JAIN, JUN ZHU, The Pennsylvania State University — We have studied the high-field transport in graphene FETs on an amorphous SiO_2 substrate by a combination of theory and experiment. A theoretical treatment using the Boltzmann equation and a drifted Fermi distribution function gives an excellent quantitative account of the experiments without any adjustable parameters. Our study establishes that the surface optical (SO) phonons of the substrate dominate the high-field transport properties in a broad range of parameters. The efficient heat dissipation directly from electrons to the substrate results in a cooling of the electrons, and hence an enhancement of the drift velocity despite the additional scattering mechanism, thus explaining a lack of saturation in current experiments. Our results suggest that one may exploit knowledge of the substrate properties to control the high field transport in graphene.

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