Abstract Submitted
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Carrier scattering, mobilities and electrostatic potential in mono-, bi- and tri-layer graphenes WENJUAN ZHU, VASILI PEREBEINOS, MARCUS FREITAG, PHAEDON AVOURIS, IBM Thomas J. Watson Research Center, Yorktown Heights, NY 10598, USA — The carrier density and temperature dependence of the Hall mobility in mono-, bi- and tri-layer graphene has been systematically studied. We found that as the carrier density increases, the mobility decreases for mono-layer graphene, while it increases for bi-layer/tri-layer graphene. This can be explained by the different density of states in mono-layer and bi-layer/tri-layer graphenes. In mono-layer, the mobility also decreases with increasing temperature primarily due to substrate surface polar phonon scattering. In bi-layer/tri-layer graphene, on the other hand, the mobility increases with temperature because the electric field of the substrate surface polar phonons is effectively screened by the additional graphene layer(s) and the mobility is dominated by Coulomb scattering. We also find that the temperature dependence of the Hall coefficient in mono-, bi- and tri-layer graphene can be explained by the formation of electron and hole puddles in graphene. This model also explains the temperature dependence of the minimum conductance of mono-, bi- and tri-layer graphene. The electrostatic potential variations across the different graphene samples are extracted.

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