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Morphology and electronic transport study of suspended graphene

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This presentation will first describe our recent electrical transport studies of suspended bilayer and trilayer graphene devices at low temperature: Bilayer graphene at the charge neutrality point is unstable to electronic interactions, and expected to host a ground state with spontaneously broken symmetries, whereas in trilayer graphene stacking order provides another important degree of freedom for tuning its electronic properties. For instance, at the Dirac point, Bernal-stacked TLG remains metallic but r-TLG becomes insulating with an intrinsic interaction-driven gap around 6 meV. Our results underscore the rich interaction-induced phenomena in both bilayer and trilayer graphene with different stacking orders, and its potential towards electronic applications. Next we will discuss the manipulation of the morphology of suspended graphene via electrostatic and thermal control: We observe significant deflections of single-, bi-, and trilayer graphene sheets in response to electrostatic force. At low temperature, wide graphene sheets ripple and butterfly features form at its two free edges. These observations have important applications for understanding electrical, mechanical, and thermal properties as well as strain engineering in suspended graphene devices.