Topics in graphene

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The talk will cover purely theoretical results on doping of graphene by N, oxygen adsorbates, and the formation and healing of self-interstitial complexes; observations using electron-energy-loss spectrum imaging in scanning transmission electron microscopy (STEM), combined with theory, showing that a) a single point defect can act as an atomic antenna in the petaHertz (10^{15} Hz) frequency range, leading to plasmon resonances at the sub-nanometer scale, and b) graphene has highly localized d-states in the conduction bands; and measurements, combined with theory, of electrical transport in multiterminal graphene devices suspended in liquids, showing that non-polar liquids enhance mobility, polar liquids degrade mobility, while all liquids suppress scattering by out-of-plane flexural phonons, which is a dominant scattering mechanism in suspended graphene at room temeperature.

Theory collaborators: Y. S. Puzyrev, J. Lee, L. Tsetseris, B. Wang; microscopy collaborators: W. Zhou, J. C. Idrobo, S. J. Pennycook; graphene device collaborators: A. K. M. Newaz, K. Bolotin. Work supported in part by DTRA, NSF, and by the U.S. Department of Energy, Materials Science and Engineering, Basic Energy Science.