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Phonon Transport in Graphene: Umklapp Quenching and Heat Conduction ALEXANDER BALANDIN, University of California - Riverside, NANO-DEVICE LABORATORY TEAM — Since its exfoliation, graphene attracted tremendous attention of the research community. Graphene, which consists of a single atomic plane of carbon atoms, revealed many unique properties including extremely high electron mobility. In this talk I will show that unusual properties of graphene are not limited to electrons alone. Phonons also behave differently in two-dimensional (2D) system such as graphene. We have recently discovered experimentally that thermal conductivity of suspended graphene layers is extremely high and exceeds that of diamond or graphite [2-3]. We explained our results theoretically by considering the Umklapp and edge scattering of phonons in graphene [3]. Unlike in bulk graphite, the phonon transport in graphene is pure 2D for all phonon energies. As a result, the thermal conductivity of graphene can become extremely high. The extraordinary high thermal conductivity of graphene can be used for thermal management of nanoscale electronic devices. This work was supported by SRC-DARPA Functional Engineered Nano Architectonics (FENA) center and Interconnect Focus Center (IFC). [1] A.A. Balandin, et al. Nano Letters, 8, 902 (2008); S. Ghosh, et al., Appl. Phys. Lett., 92, 151911 (2008). [2] D.L. Nika, et al., Phys. Rev. B, 79, 155413 (2009); D.L. Nika et al., Appl. Phys. Lett., 94, 203103 (2009)

Alexander Balandin
University of California - Riverside

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