

Title: Hot carriers in disordered graphene with hexagonal-Boron Nitride and multi-layer graphene: role of two-dimensional material cooling

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In this invited talk, I would present the energy relaxation of hot carriers in disordered CVD-grown graphene devices with top h-BN and multi-layer exfoliated graphene by driving the devices into the non-equilibrium regime. By using the magnetic field dependent conductance fluctuations of our graphene devices as a self-thermometer, we are able to determine the effective carrier temperature T_e at different driving current I while the lattice temperature T_L fixed. Interestingly, it is found that T_e is proportional to I in both of the disordered graphene devices, indicative the little electron-phonon scattering. Furthermore the average rate of energy loss per carrier P_e is proportional to T_e^2-T_L^2, suggestive the heat diffusion rather than acoustic phonon processes. Consequently, we have shown that the energy relaxation time of the CVD graphene with a top h-BN sheet is two orders of magnitude faster than that in multi-layer graphene, which suggests a great advantage for future graphene-based bolometer applications.

Biography

Dr. Chiashain Chuang is a 2015 JSPS Foreign Postdoctoral Fellow in Graduate School Engineering, Chiba University. He completed his Ph.D (2015) degrees in Department of Physics, from National Taiwan University. From 2011-2012, he was a visiting scholar at Semiconductor Physics group, Cavendish Laboratory, University of Cambridge, U.K.. From 2012-2014, he was a visiting scholar at Graduate School of Advanced Integration Science, Chiba University, Japan. From 2014-2015, he was a guest scientist in National Institute of Standar and Technology, USA. He has published 27 SCI papers and more than 143 citations with h-index 7 about graphene transport nanodevices and is the reviewer for 6 International Journals.

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