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Li adatoms on graphene: doping and intervalley scattering ALI KHADEMI, EBRAHIM SAJADI, PINDER DOSANJH, DOUG BONN, JOSHUA FOLK, Stewart Blusson Quantum Matter Institute and Department of Physics and Astronomy, University of British Columbia, Vancouver, BC, Canada, ALEXANDER STHR, STIVEN FORTI, ULRICH STARKE, Max Planck Institute for Solid State Research, 70569 Stuttgart, Germany — Charge doping by alkali atoms (Li) deposited under cryogenic ultrahigh-vacuum conditions is arguably the simplest of all adatom effects on graphene. We present an experimental investigation of Li adatoms on epitaxial and CVD graphene, focusing on the crucial role of high temperature annealing prior to cryogenic deposition for efficient doping and a measurement of how the adatoms affect the intervalley scattering rate. While doping saturated at 210^{13} e/cm^{-2} on unannealed graphene, independent of previous processing, a 700 K/900 K anneal prior to cryogenic deposition caused the saturated doping level to rise one order of magnitude to above 10^{14} e/cm^{-2} [1]. For the annealed samples, long range Coulomb interaction due to Li adatoms caused a dramatic enhancement of the intervalley scattering, a result that contradicts the naive expectation that short range scattering is necessary for intervalley scattering but is qualitatively consistent with theoretical predictions in Ref. [2]. [1] A. Khademi, et al., arXiv:1610.00301. [2] P. Boross, et al., Phys. Rev. B. 92, 035420 (2015).

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