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Atomic characterization of monolayer doped graphene sheets synthesized by chemical vapor deposition R.T. LU, Department of Physics, The Pennsylvania State University, USA, Q. LI, Center for Nanophase Materials Sciences Division, Oak Ridge National Laboratory, USA, A. BOTELLO-MÉNDEZ, Institute of Condensed Matter and Nanosciences, Universit Catholique de Louvain, Belgium, J.C. CHARLIER, Institute of Condensed Matter and Nanosciences, Université Catholique de Louvain, Belgium, B. WANG, A. BERKDEMIR, H.R. GUTIÉRREZ, J. ZHU, H. TERRONES, Department of Physics, The Pennsylvania State University, USA, M.H. PAN, Center for Nanophase Materials Sciences Division, Oak Ridge National Laboratory, USA, M. TERRONES, Department of Physics, The Pennsylvania State University, USA; Research Center for Exotic Nanocarbons, Shinshu University, Japan — Large-area, high-quality monolayer nitrogen (or boron)-doped graphene sheets were synthesized on copper foils by a modified chemical vapor deposition (CVD) apparatus. As-grown graphene sheets could be easily transferred from copper foils onto different substrates (e.g. silicon/silicon dioxide wafers). Compared with pristine graphene, nitrogen (or boron)-doped graphene shows strong D-band caused by doping and structural defects formed within the lattice. Scanning tunneling microscopy (STM) and spectroscopy (STS) reveal that the defects in the doped graphene samples arrange in different geometrical configurations. The localized states in the valence and conduction bands are in accordance with the type of dopant and bonding type. These experimental results are in agreement with first principles calculations of LDOS of doped graphene and STM image simulations.

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