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Room-Temperature, Low-Barrier Boron Doping of Graphene SHIXUAN DU, Institute of Physics, Chinese Academy of Sciences — Doping graphene with boron has been difficult because of high reaction barriers. Here, we describe a low-energy reaction route derived from first-principles calculations and validated by experiments. We find that a boron atom on graphene on a ruthenium(0001) substrate can replace a carbon by pushing it through, with substrate attraction helping to reduce the barrier to only 0.1 eV, implying that the doping can take place at room temperature. High-quality graphene is grown on a Ru(0001) surface and exposed to B2H6. Scanning tunneling microscopy/spectroscopy and X-ray photoelectron spectroscopy confirmed that boron is indeed incorporated substitutionally without disturbing the graphene lattice. (L.D. Pan et al., Nano Lett. 2015, 15, 6464. In collaboration with Lida Pan, Yande Que, Hui Chen, Dongfei Wang, Jun Li, Chengmin Shen, Wende Xiao, Hongjun Gao in CAS, and S. Pantellides in Vanderbilt University.)

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