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Atomic Scale Visualization of Dopant-Induced Unconventional Kondo Effect in Boron-doped graphene[1] MINGHU PAN, QING LI, Oak Ridge National Laboratory, LIANGBO LIANG, Rensselaer Polytechnic Institute, RUITAO LV, The Pennsylvania State University, WENZHI LIN, ORNL, EDUARDO COSTA GIRÃO, Rensselaer Polytechnic Institute, ANDRÉS R. BOTELLO-MÉNDEZ, Universit Catholique de Louvain,Belgium, ANA LAURA ELÍAS, The Pennsylvania State University, RODOLFO CRUZ-SILVA, Shinshu University, Japan, JEAN CHRISTOPHE CHARLIER, Universit Catholique de Louvain,Belgium, MAURICIO TERRONES, The Pennsylvania State University, VINCENT MEUNIER, Rensselaer Polytechnic Institute — We describe the synthesis of large-area, highly-crystalline monolayer Boron-doped graphene (BG) sheets via atmospheric-pressure chemical vapor deposition, yielding unique and diverse B-doping site composed of substitutional Boron atoms and carbon vacancies. Scanning tunneling microscopy and spectroscopy (STM and STS) of BG reveal the presence of localized states in both the conduction and valence bands induced by Boron pz orbitals, confirmed by ab initio calculations. Furthermore, we demonstrate for the first time that atomic-resolved spin-polarization in a graphene sublattice via spectroscopic imaging of zero-energy states, induced by Boron incorporation. BG acts as a Kondo system with magnetic dopants embedded in C lattices, fully described by using the non-equilibrium Green's function method within the slave-boson mean-field approximation.

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