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Spin-induced modification of Dirac band on Fe-intercalated graphene system SIJIN SUNG, JAEWOON YANG, PAENGRO LEE, JINGUL KIM, MINTAE RYU, HEEMIN PARK, Department of Physics, Pohang University of Science and Technology, CHANCUK HWANG, Beamline Research Division, Pohang Accelerator Laboratory,Pohang, KWANGSU KIM, Department of Chemistry, Pohang University of Science and Technolog, JAESAM KIM, JINWOOK CHUNG, Department of Physics, Pohang University of Science and Technology — Intercalation of magnetic iron atoms through graphene formed on the SiC(0001) surface is found to induce significant changes in electronic properties of graphene due mainly to the Fe-induced asymmetries in charge as well as spin distribution. From our synchrotron-based photoelectron spectroscopy data together with *ab initio* calculations, we observe that the Fe-induced charge asymmetry results in the formation of a quasi-free-standing bilayer graphene while the spin asymmetry drives multiple spin-split bands. We find that Fe adatoms are best intercalated upon annealing at 600°C exhibiting split linear π-bands, characteristic of a bilayer graphene, but much diffused. Subsequent changes in the C 1s, Si 2p, and Fe 3p core levels are consistently described in terms of Fe-intercalation. Our calculations together with a spin-dependent tight binding model ascribe the diffused nature of the π-bands to the multiple spin-split bands originated from the spin-injected carbon atoms residing only in the lower graphene layer.

Sijin Sung
Department of Physics, Pohang University of Science and Technology

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