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CVD-based, photolithographically patterned, highly-sensitive graphene Hall element on hexagonal BN JOONGGYU KIM, Center for Integrated Nanostructure Physics, Institute for Basic Science, DOES, Sungkyunkwan University, MIN-KYU JOO, JI-HOON PARK, Center for Integrated Nanostructure Physics, Institute for Basic Science, Sungkyunkwan University, VAN LUAN NGUYEN, Center for Integrated Nanostructure Physics, Institute for Basic Science, DOES, Sungkyunkwan University, KI KANG KIM, Department of Energy and Materials Engineering, Dongguk University, YOUNG HEE LEE, DONGSEOK SUH, Center for Integrated Nanostructure Physics, Institute for Basic Science, DOES, Sungkyunkwan University — Graphene is known to have a high carrier mobility, and the carrier density can be minimized at the charge neutrality point (CNP). Because such features are suitable for Hall sensor measuring magnetic field, we examined the possibility of graphene Hall element (GHE) as a highly sensitive magnetic sensor. For the high-throughput production of GHE in the future, the material synthesized by a chemical-vapor-deposition (CVD) method and the fabrication processes based on photolithography were adopted to show its mass-production feasibility. Specifically, the CVD synthesized hexagonal BN (hBN) was tested as a protection layer of graphene from extrinsic doping driven by SiO_2 substrate, which causes the shift of CNP. In addition, post annealing sequences were also included between each step, such as the hBN attachment on SiO_2 and the graphene transfer on hBN/SiO_2 substrate followed by the PMMA removal. From this work, we can get minimum magnetic resolution around 10 mG/$Hz^{0.5}$ at 300 Hz.

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