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Graphene Hall sensor fabricated by CMOS-compatible processes and its performance prediction without magnetic field[1] JOONGGYU KIM, MIN-KYU JOO, CINAP, IBS, DOES, SKKU, Suwon 16419, Korea, JI-HOON PARK, VAN LUAN NGUYEN, CINAP, IBS, Suwon 16419, Korea, KI KANG KIM, Department of Energy and Materials Engineering, Dongguk University, Seoul 04620, Korea, YOUNG HEE LEE, CINAP, IBS, DOES, SKKU, Suwon 16419, Korea, DONGSEOK SUH, DOES, SKKU, Suwon 16419, Korea — Graphene has been considered as an optimal material for a magnetic sensor because of its high carrier mobility, atomic thickness, and easy modulation of carrier concentration. Although numerous prototype device structures have revealed their advanced performances utilizing these unique and beneficial features, device fabrications using mechanically exfoliated graphene material and electron beam lithography method limit its feasibility as an industrial-level magnetic sensor. Here, we demonstrate a large-area and photolithographically patterned graphene Hall element (GHE) array based on heterostructure of 2-D materials grown by chemical vapor deposition (CVD) techniques [1]. Outstanding performance of GHE was achieved with a bottom hexagonal-BN (h-BN) layer, and the device showed maximum current relative sensitivity (S_I) of 1,986 V/AT and minimum magnetic resolution of 0.5 mG/Hz$^{0.5}$ at f = 300 Hz. Besides, from the deep understanding of various parameters such as the shift of charge neutrality point and transconductance dependent S_I, an analytical model is proposed for the prediction of sensor performance without magnetic field. [1] *ACS Nano*, **10**, 9, 8803-8811 (2016)

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