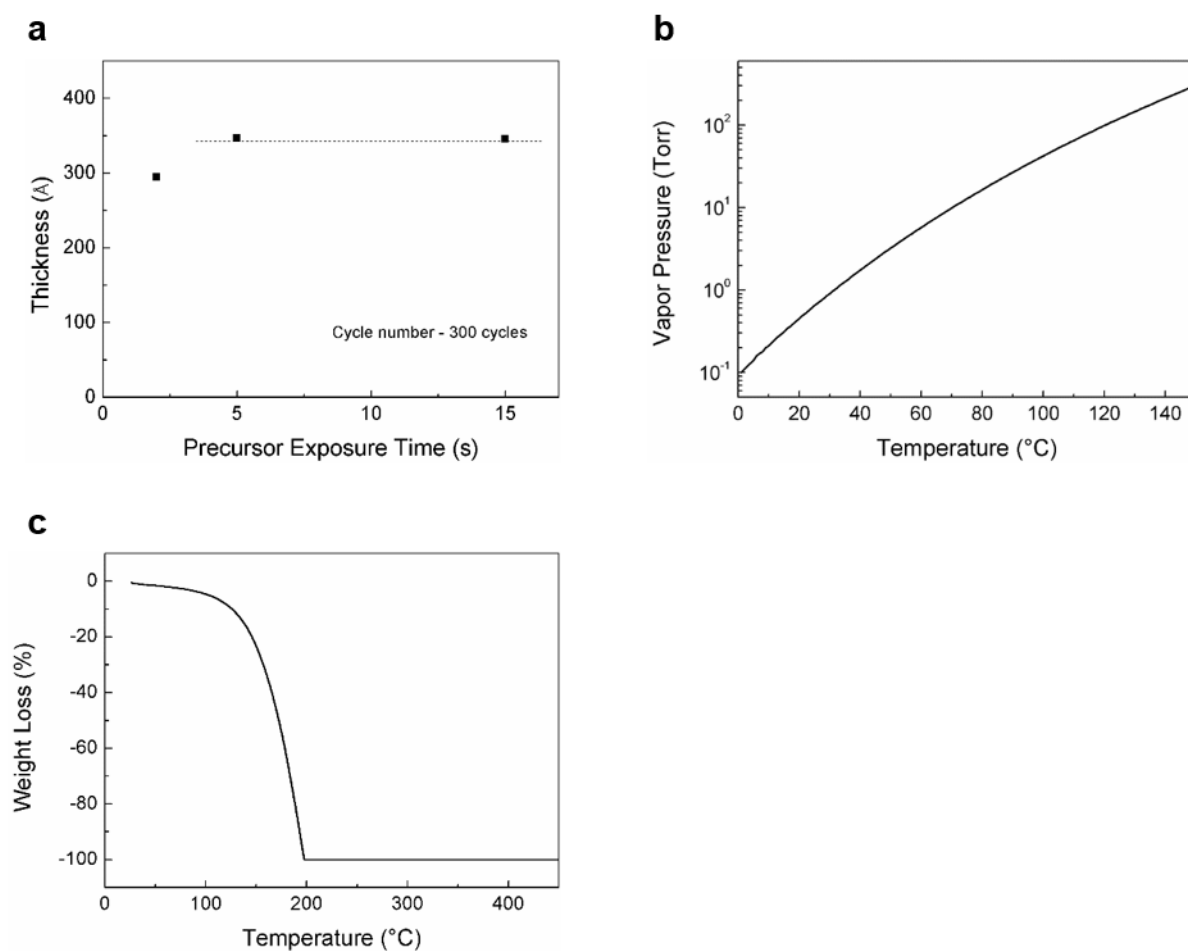


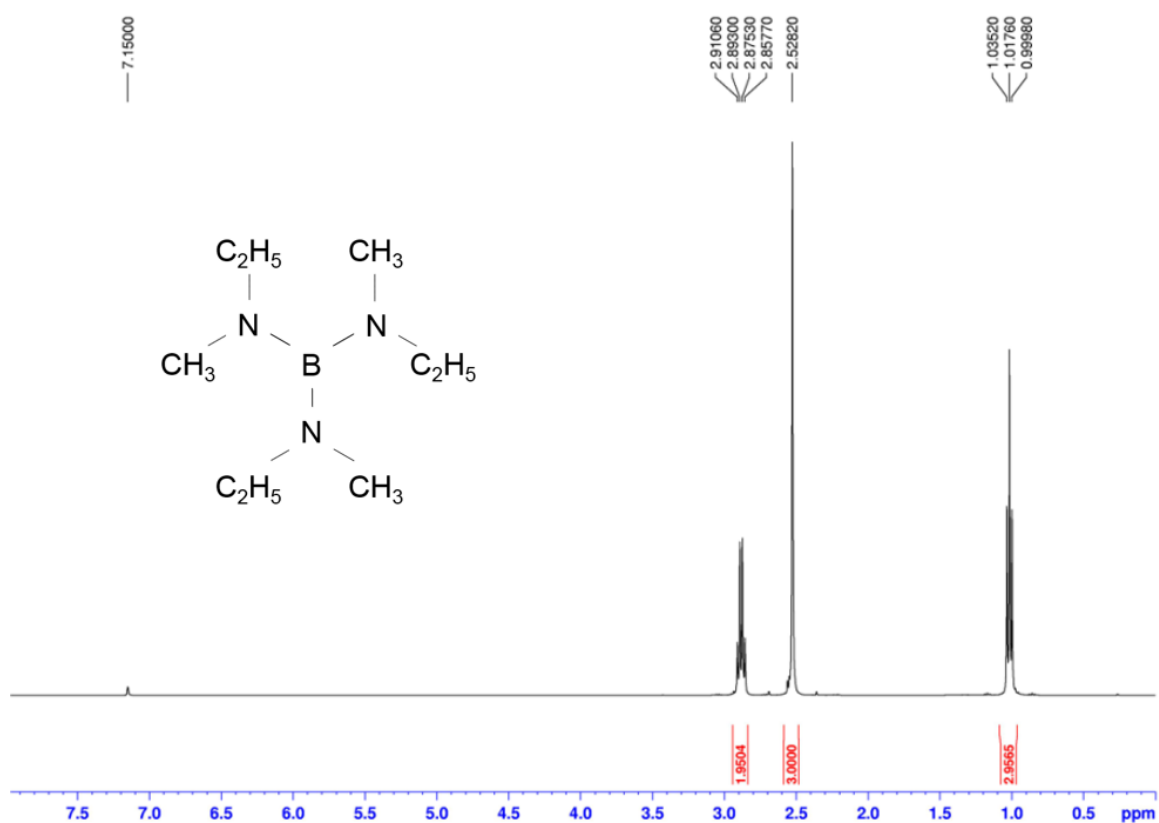
Supplementary Information

Large-scale synthesis of uniform hexagonal boron nitride films by plasma-enhanced atomic layer deposition

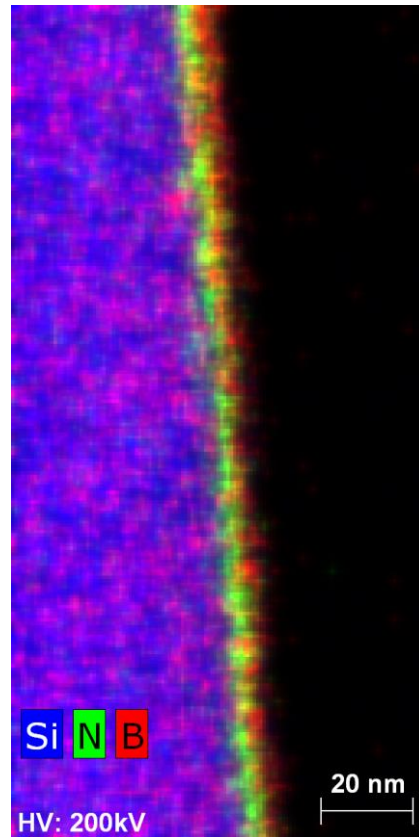
Hamin Park, Tae Keun Kim, Sung Woo Cho, Hong Seok Jang, Sang Ick Lee, and Sung-Yool Choi*



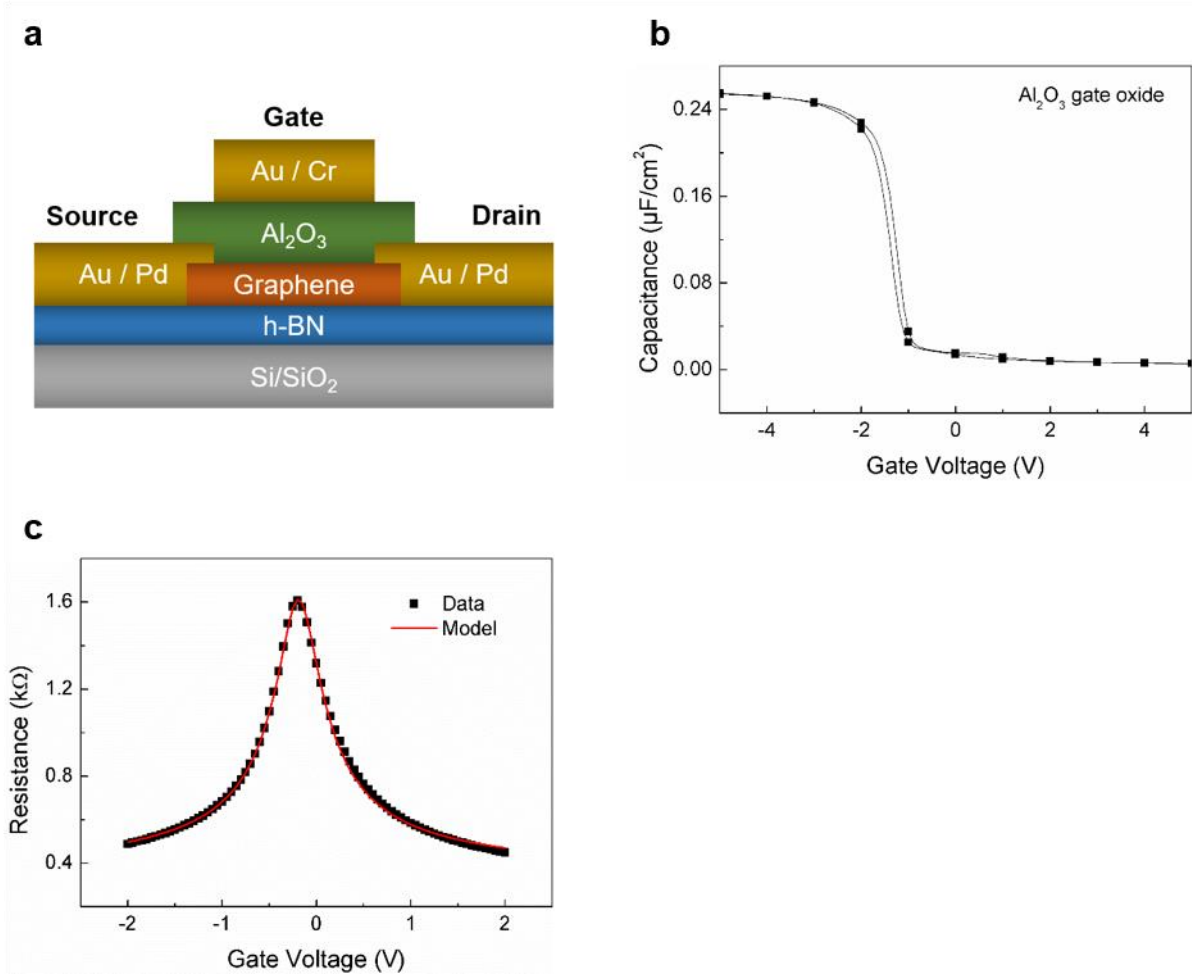
Supplementary Figure 1 | ALD precursor characteristics. (a) h-BN film thickness as a function of the precursor exposure time. (b) TEMAB vapor pressure as a function of temperature. (c) A TG curve recorded for the TEMAB precursor.



Supplementary Figure 2 | ¹H NMR spectrum for the precursor (TEMAB, C₉H₂₄BN₃). ¹H NMR (400MHz, C₆D₆): δ 2.88 (q, J = 7.1 Hz, 6H), 2.53 (s, 9H), 1.02 (t, J = 7.1 Hz, 9H).



Supplementary Figure 3 | EDS elemental analysis. An EDS map for the cross-section of the h-BN film deposited on the trench sidewall.



Supplementary Figure 4 | GFET characterization. (a) Schematic cross-sectional view of the top-gate GFET on h-BN substrate. (b) A capacitance-voltage curve for the Al₂O₃ gate dielectric film deposited on a Si substrate simultaneously with other graphene samples. A small positive charge was detected in the gate dielectric due to the presence of contaminant species in the deposition chamber. (c) A R_{DS}-V_G plot corresponding to the representative transfer curve depicted in Figure 4b. The fitted curve can be described by the following equation:

$$R = 2R_C + 2R_A + \frac{L}{We\mu\sqrt{n_0^2 + n_G^2}}$$

where L and W are the gate length and width, and R_C and R_A are the contact and access resistances, respectively. n₀ is the residual carrier density at the Dirac voltage, and n_G is the gate-induced carrier density, which is equal to C_{ox}(V_G-V_{Dirac})/e.