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Transport properties of HfO_2 top-gated bilayer graphene field effect transistors K. ZOU, J. ZHU, Department of Physics, The Pennsylvania State University — We present the fabrication and electrical transport studies of SiO_2/HfO_2 double-gated bilayer graphene field effect transistors (FETs). The top gate dielectric layer is formed by depositing 30nm HfO_2 onto graphene FETs fabricated on conventional SiO_2/doped Si substrates, using low temperature atomic layer deposition without the use of an adhesion layer. The top gate has an excellent gating efficiency of $\sim$2.8x10^{12}/cm^{2}V, which is 40 times larger than that of the Si backgate and can reach carrier density 1.4x10^{13}/cm^2. We observe electron mobility up to 6,000 cm^2/Vs in double-gated bilayers. Pristine bilayer graphene on SiO_2, on the other hand, exhibits μ = 12,000 cm^2/Vs. We report and discuss the temperature-dependent conductivity in double and single-gated bilayer graphene at different densities and bias electric fields.

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