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Implementation of embedded-gate graphene field effect transistors on flexible substrates JONGHO LEE, LI TAO, MILO HOLT, DEJI AKINWANDE, University of Texas at Austin — In this work we present embedded-gate graphene field effect transistors (GFETs) on flexible polyimide films for high frequency RF and sensor applications. Graphene transistors with gate lengths from 1um to 4um and width of 8um have been realized by e-beam lithography. Chemical vapor deposited monolayer graphene with negligible defects is transferred to flexible polyimide substrates for device fabrication. The electrostatic measurement reveals that fabricated device shows a mobility of over 1000cm^2/Vs at room temperature, the highest reported among graphene FETs implemented on flexible films. Surface roughness and impurity doping are of crucial importance in fabricating flexible graphene devices since its charge transport is limited by mobility degradation due to surface roughness and doping related with the chemical transfer process. The stack of atomic layer deposited Al_2O_3 as gate dielectric and gate pads underneath provides smooth surface for graphene to sit on as confirmed by atomic force microscopy. This results in a field effect mobility of an embedded gate GFET twice that of a top gated GFET on polyimide substrates. The minimum conduction point is close to zero, indicting the impurity induced doping for the device is negligible.

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