Abstract Submitted
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Graphene/Oxide Heterostructure devices[1] WEITAO DAI, CHENG CEN, West Virginia University, CEN LAB TEAM — Engineering graphene's properties in nanoscale with minimum material degradation and maximum flexibility is an outstanding challenge in graphene based technologies. Here we present a method targeting at on-demand tuning of graphene based on the integration of graphene and a novel complex oxide heterostructure. The recent development of complex oxides has raised the prospect for new classes of electronic devices. In particular, researchers have discovered a high-mobility two-dimensional electron gas forming at the interface between LaAlO3 (LAO) and SrTiO3 (STO). More interestingly, in samples with 3-unit-cell LAO film grown on STO substrate, a biased conducting atomic force microscope probe can locally and reversibly controls the interfacial metal-insulator transition. The close coupling of graphene with these programmable interfacial nanostructures in graphene/LAO/STO heterostructures presents numerous device opportunities. Samples with contacts addressing graphene and oxide interface separately were fabricated. CVD graphene was transferred using PMMA and then patterned. Si/LAO/STO substrates was designed and fabricated to solve graphene visibility problem. Transport experiments were performed on the hybrid bilayer conducting system and strong mutual gating effect was observed. In summary good quality graphene/LAO/STO transport samples were fabricated and characterized, which paved the way to the various graphene/LAO/STO based optical and electrical devices such as plasmon waveguide, photo emitting diode, etc.

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