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New Method of fabricating high-mobility graphene/$LaAlO_3$/$SrTiO_3$ nanostructures[1] SHIVENDRA TRIPATHI, GIRIRAJ JNAWALI, LU CHEN, MENGCHENG HUANG, JEN-FENG HSU, BRIAN D'URSO, University of Pittsburgh, HYUNGWOO LEE, CHANG-BEOM EOM, University of Wisconsin-Madison, PATRICK IRVIN, JEREMY LEVY, University of Pittsburgh — Graphene and $LaAlO_3$/$SrTiO_3$ (LAO/STO) are both two-dimensional electronic systems with a fascinating range of properties. The coupling between these two 2DEGs has the potential to produce various novel phenomena and create new functionalities. Successful integration of these two systems must overcome a number of technical challenges. Graphene-complex-oxide (GCO) heterostructures are created using Hyflon AD (2,2,4-trifluoro-5 trifluoromethoxy-1,3 dioxole) as a support layer for transferring and patterning CVD graphene on LAO/STO. This approach has advantages over more traditional methods that use Poly(Methyl Methacrylate) (PPMA) to transfer CVD graphene in that the Hyflon is easier to remove from the oxide surface after processing. To test the quality of GCO heterostructures, a graphene Hall bar structure is created. The quantum Hall regime can routinely be reached in the graphene layer, while preserving the ability of the LAO/STO to be patterned using AFM lithography. This approach opens up the possibility for the exploration of a wide range of GCO devices.

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