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Nanoscale control of oxide interface conduction in graphene-complex-oxide heterostructures[1] MENGCHEN HUANG, University of Pittsburgh, SANGWOO RYU, University of Wisconsin-Madison, FERESHTE GHAHARI, Columbia University, GIRIRAJ JNAWALI, University of Pittsburgh, JAYAKANTH RAVICHANDRAN, Columbia University, PATRICK IRVIN, University of Pittsburgh, PHILIP KIM, Columbia University, CHANG-BEOM EOM, University of Wisconsin-Madison, JEREMY LEVY, University of Pittsburgh — Graphene is a promising material for high-speed optoelectronic devices such as THz modulators and detectors. Recently, broadband THz emission and detection can be achieved with nanostructures at the $LaAlO_3/SrTiO_3$ interface [2]. We have mechanically exfoliated single layer and multilayer graphene on top of 3.4 unit cell $LaAlO_3/SrTiO_3$ and successfully sketched nanowires in the 2DEG underneath graphene using conductive AFM lithgraphy [3]. Raman and AFM investigations confirm that the graphene quality and surface morphology remain unaltered by the writing process. These first experimental demonstrations of integrating graphene and $LaAlO_3/SrTiO_3$ are promising for future DC-THz photonic applications.

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[2]Y. Ma, *et al.*, *Nano Lett.* **13**, 2284 (2013)
[3]C. Cen, *et al.*, *Nat. Mater.* **7**, 298 (2008)

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