Abstract Submitted
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High-mobility sketched nanostructures at the $Al_2O_3/SrTiO_3$ interface[1] SHICHENG LU, Department of Physics and Astronomy, University of Pittsburgh, SANG WOON LEE, Department of Chemistry and Chemical Biology, Harvard University, GUANGLEI CHENG, FENG BI, AKASH LEVY, MENGCHEN HUANG, PATRICK IRVIN, Department of Physics and Astronomy, University of Pittsburgh, ROY G. GORDON, Department of Chemistry and Chemical Biology, Harvard University, JEREMY LEVY, Department of Physics and Astronomy, University of Pittsburgh — A two dimensional electron gas has recently been demonstrated at the interface between amorphous Al_2O_3 and TiO_2-terminated $SrTiO_3$ by atomic layer deposition (ALO/STO).[2] Similar to $LaAlO_3/SrTiO_3$ heterostructrues, when the ALO thickness exceeds a critical thickness, the interface becomes conducting. By using a conducting atomic force microscope tip to control the metal-insulator transition at nanoscale dimensions, we are able to create nanostructures with exceptionally high mobility. Quasi-two-dimensional written structures exhibit Shubnikov de Haas oscillations and mobilities in excess of 2,000 cm^2/Vs. Furthermore, by decreasing the channel width to 10 nm width, the mobility becomes as high as 100,000 cm^2/Vs.

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[2]S. W. Lee, *et al.*, Nano Lett. **12**, 4775 (2012).

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