

Abstract Submitted
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Low temperature Study of Oxide Nanostructures¹ RICKI GARDEN, CHENG CEN, JEREMY LEVY — Nanoscale control of the metal-insulator transition at the interface between LaAlO_3 and SrTiO_3 , which utilizes a conducting atomic force microscope (AFM) probe to define conducting and insulating regions, combines the precision and control of top-down lithographic approaches with the special quality resembling self-assembly of the material itself¹. Recently, a sketch based transistor (SketchFET) device was created with characteristic dimensions as small as 2 nm^2 . Here we describe the low temperature transport measurement carried out on SketchFET devices with different structural modifications. Activation energies under different gating conditions is extracted from temperature dependent measurement. At low temperature, sharp peaks of tunneling current are observed and attributed to structural phase transitions in SrTiO_3 . With an additional nanoisland in the middle, SketchFETs exhibit hysteretic and nonlinear behavior which is attributed to hysteretic charging in the nanoisland. [1] C. Cen, S. Thiel, K. E. Andersen, C. S. Hellberg, J. Mannhart, and J. Levy, *Nature Materials* **7**, 2136 (2008). [2] C. Cen, S. Thiel, J. Mannhart, and J. Levy, *Science* **323**, 1026 (2009)

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