LaAlO$_3$/SrTiO$_3$ field-effect nanodevices using in-situ-grown Au top gates\textsuperscript{1} YUN-YI PAI, MENGCHEN HUANG, Univ of Pittsburgh, HYUNG-WOO LEE, CHANG-BEOM EOM, Univ of Wisconsin-Madison, PATRICK IRVIN, JEREMY LEVY, Univ of Pittsburgh — Conductive-atomic force microscope (c-AFM) lithography can create a wide range of nanostructures based on the LaAlO$_3$/SrTiO$_3$ system, including field effect transistors\textsuperscript{2}, single-electron transistors\textsuperscript{3} and superconducting nanoelectronics\textsuperscript{4}. However, the operating range of gated devices is often limited by tunneling through insulating barriers. Using in-situ Au deposited on top of LaAlO$_3$, we create vertical field-effect devices with significantly lower leakage due to the large bandgap of LaAlO$_3$. We describe the fabrication process for vertical field-effect nanodevices and show representative transport measurements both at room temperature and low temperatures.

\textsuperscript{1}We gratefully acknowledge support for this work from NSF (DMR-1124131 and DMR-0704022 and DMR-1234096) and AFOSR (FA9550-10-1-0524 and FA9550-12-1-0342).


\textsuperscript{4}J. P. Veazey, \textit{et al.}, Nanotechnology 24, 375201 (2013).