

# Oxide Nanoelectronics on Demand

Guanglei Cheng

Department of Physics and Astronomy, University of Pittsburgh, Pittsburgh, PA 15260

Electronic confinement at nanoscale dimensions remains a central means of science and technology. I will describe a novel method for producing electronic nanostructures at the interface between two normally insulating oxides,  $\text{LaAlO}_3$  and  $\text{SrTiO}_3$ . These structures and devices are "written" by a conductive atomic force microscope probe in ambient conditions at room temperature, and can be erased and reconfigured. The spatial dimensions of these structures are comparable to the width of a single-wall carbon nanotube ( $\sim 2$  nm). A wide variety of devices can be created, including nanowires, tunnel junctions, diodes, field-effect transistors, single-electron transistors, superconducting nanowires, and nanoscale THz emitters and detectors. This new, on-demand nanoelectronics platform has the potential for widespread scientific and technological exploitation.