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TOPIC:
Oxide Nanoelectronics On Demand

ABSTRACT:

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, LaAlO3 and SrTiO3. Conducting nanostructures are written, erased and reconfigured under ambient conditions at room temperature. 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. The talk will focus on two recent results: the discovery of a novel phase in which electrons form pairs without becoming superconducting, and the discovery of electronically controlled ferromagnetism at room temperature.