

Abstract Submitted
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Nanoscale Electrical Properties of Oxide Heterostructures Revealed Via Introspection¹ CHENG CEN, STEFAN THIEL, JOCHEN MANNHART, JEREMY LEVY — Previous work shows that conductive regions can be formed via lateral nanoscale confinement of a quasi-two-dimensional electron gas at the LaAlO₃/SrTiO₃ interface². Here we demonstrate how structures constructed in this method serve not only as novel nanoelectronic devices but also as tools for studying fundamental physics in the underlying material system. Nanowires, tunnel junctions, field effect transistors (FETs), together with associated phenomena that we observed such as negative differential resistance, provide insight into the mechanism responsible for the existence and spatial confinement of the interfacial metal-insulator transition. We discuss several examples of nanodevices and the constraints they place on models and mechanisms that govern their properties. ²Cen et al, Nature Materials 7, 298 (2008).

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