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Nanoscale Electrostatic Confinement at Oxide Interfaces SRIJIT GOSWAMI, EMRE MULAZIMOGLU, LIEVEN VANDERSYPEN, ANDREA CAVIGLIA, Delft University of Technology — We develop a robust and versatile platform to define nanostructures at oxide interfaces via patterned top gates. Using $LaAlO_3/SrTiO_3$ as a model system, we demonstrate controllable confinement of electrons to nanoscale regions in the conducting interface. The excellent gate response, ultra-low leakage currents, and long term stability of these gates allows us to perform a detailed study of devices in a split-gate geometry. Electrical transport through such devices displays a distinct threshold associated with depletion directly below the gates, resulting in the formation of a narrow conducting channel even at room temperature. We examine the effects of cross-talk between the gates, and also show that a combination of top gates and back gate can be used to efficiently modulate charge transport through these nanostructures.

Srijit Goswami
Delft University of Technology

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