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Direct Patterning of Oxide Interface with High Mobility 2DEG without Physical Etching NIRUPAM BANERJEE, MARK HUIJBEN, GERT-JAN KOSTER, GUUS RIJNDERS, University of Twente — Discovery of highly mobile two dimensional electron gas (2DEG) at the atomically engineered interface between two wide band-gap perovskite insulators, SrTiO₃ (STO) and LaAlO₃ (LAO) has stimulated the research to apply oxide materials in electronic devices such as high mobility electron transistors (HMET). In spite of excellent interfacial transport properties manifested, challenges remained in structuring these heterointerfaces without damaging the STO single crystal. Top-down physical etching process was an unsuitable choice to serve the purpose since it induces substrate conductivity through creation of oxygen vacancies. Here, we will demonstrate development of a novel procedure for fabricating patterned functional interfaces based on epitaxial-lift-off technique. With its help devices incorporating patterned interfaces of LAO-STO was fabricated devoid of any physical etching process performed and temperature dependent magneto transport properties were investigated. The results demonstrated conservation of the high-quality interface properties in the patterned structures enabling future studies of low-dimensional confinement on high mobility interface conductivity as well as interfacial magnetism.

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