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Enhanced transition temperature due to tetragonal domains in two-dimensional superconducting strontium titanate HILARY NOAD, SIMES, SLAC National Accelerator Laboratory; Department of Applied Physics, Stanford University, KATJA NOWACK, Department of Applied Physics, Stanford University, ERIC SPANTON, SIMES, SLAC National Accelerator Laboratory; Department of Physics, Stanford University, HISASHI INOUE, Department of Applied Physics, Stanford University, MINU KIM, CHRIS BELL, YASUYUKI HIKITA, SIMES, SLAC National Accelerator Laboratory, HAROLD Y. HWANG, SIMES, SLAC National Accelerator Laboratory; Department of Applied Physics, Stanford University, KATHRYN MOLER, SIMES, SLAC National Accelerator Laboratory; Departments of Physics and Applied Physics, Stanford University — Strontium titanate ($SrTiO_3$) is a key component in superconducting heterostructures such as $LaAlO_3/SrTiO_3$ and monolayer FeSe on $SrTiO_3$, yet superconductivity in bare $SrTiO_3$ is not fully understood. We used a scanning superconducting quantum interference device susceptometer to image the diamagnetic response as a function of temperature in samples of $SrTiO_3$ containing either a 5.5 nm or a 36.9 nm-thick slab of niobium-doped $SrTiO_3$. We find that stripe-like regions remain superconducting at higher temperatures than the rest of the sample. The shape and orientation of the features, as well as their behavior in a subsequent cooldown, are consistent with an origin in the low-temperature tetragonal domain structure of $SrTiO_3$. These results suggest a variety of mechanisms by which the transition temperature could be enhanced and may help constrain theories of superconductivity in $SrTiO_3$.

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