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Transport anisotropy controlled by oxygen vacancy concentration in (111) $LaAlO_3/SrTiO_3$ heterostructures[1] VENKAT CHANDRASEKHAR, SAMUEL DAVIS, Northwestern University, ZHEN HUANG, KUN HAN, ARIANDO ARIANDO[2], THIRUMALAI VENKATESAN, National University of Singapore — The 2-dimensional electron gas that forms at the interface between the band insulators LaAlO3 and SrTiO3 (LAO/STO) has proven to be a rich playground for studying tunable, strongly correlated behavior, with the majority of previous studies focusing on the (001) orientation of the heterostructure. In this work we focus on the (111) orientation of the LAO/STO heterostructure, which has only recently been shown to be conducting. Previously we have shown that the (111) 2DEG exhibits anisotropy along two, orthogonal, crystal directions, and that the anisotropy is strongly tuned via an electrostatic back-gate potential.1 In this work, we show that the anisotropy in the electronic properties at the (111) LaAlO3 and SrTiO3 interface can be tuned by post-growth treatments, such as Oxygen annealing, Ar/H2 annealing, and UV exposure. Specifically, this treatment strongly affects the dependence of the device resistance, carrier concentration, and directional anisotropy on electrostatic back-gate voltage. We attribute these effects to changes in the oxygen vacancy concentration at the interface. 1) S. Davis, V. Chandrasekhar, Z. Huang, K. Han, Ariando, T. Venkatesan, Arxiv, 2015 1603.04538.

[1]DOE Grant DE-FG02-06ER46346
[2]Prof. Ariando only has a first name. I have entered it twice, please delete the last name.

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