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The Influence of Oxygen in Transition Metal Oxides P.L. BACH, V. LEBORAN, F. RIVADULLA, University of Santiago de Compostela — The existence of a 2D metallic state at the interface between  $LaAlO_3$  and  $SrTiO_3$  (LAO/STO) has generated much excitement. Its origin has been attributed to charge redistribution to avoid a dielectric catastrophe; however, oxygen vacancies in TiO<sub>2</sub>-terminated STO can play a significant role in the electronic properties of the interface. In order to determine the nature and origin of the metallic phase, we have induced vacancies in TiO<sub>2</sub>-terminated STO single crystal substrates by annealing under controlled vacuum conditions. We report resistivity, Hall effect, and thermopower measurements on these materials and discuss their implications for the nature of the 2D electron gas at the STO surface. We have explored the possibility of gate-tuning these systems in order to fabricate single-oxide based devices. This work was supported by the Ministerio de Ciencia e Innovación (Spain), grant MAT2010-16157, and the European Research Council, grant ERC-2010-StG 259082 2D THERMS.

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