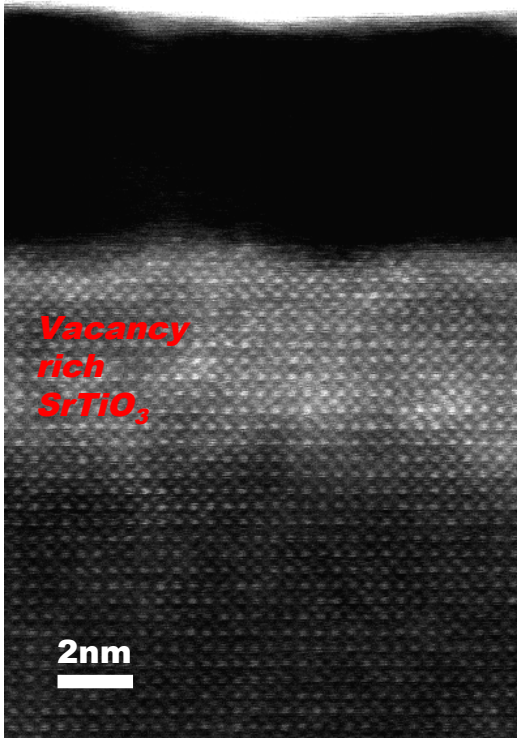
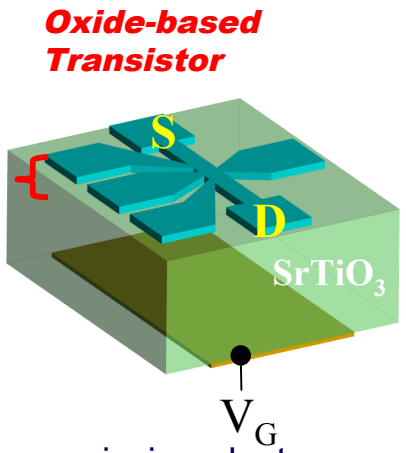
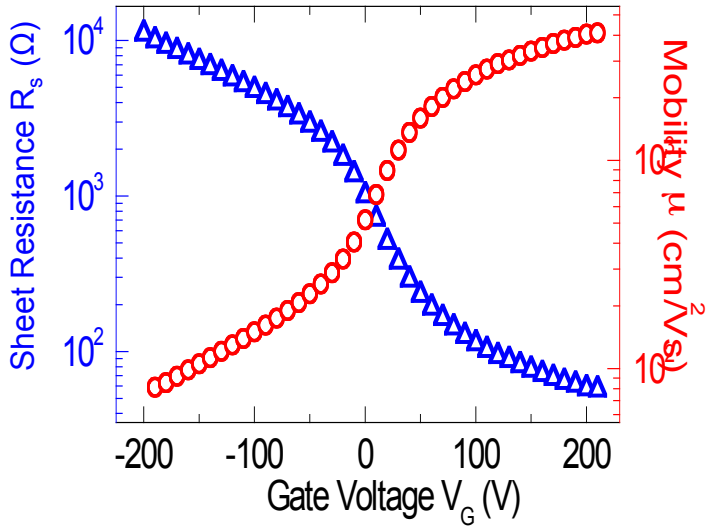
Creating new devices using oxide materials

The unique properties of transition metal oxides allow electrons to be manipulated in new ways. At CRISP, we have created an oxide device that enables a gas of electrons to be expanded or compressed with an applied electric field. The expansion or compression of the gas modulates the speed of moving electrons. The change in the speed of the electrons could be utilized in high speed transistors.





Transmission electron microscope image of $SrTiO_3$, showing a nano-thin layer containing oxygen vacancies. The oxygen vacancies provide a reservoir of mobile electrons.



Transport measurements show the expansion and compression of the electron gas modifies the mobility, or "speed" of the electrons

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