

Abstract Submitted
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Switchable two-dimensional electron gas at the interface of a ferroelectric and nonpolar insulator: BaTiO₃/SrTiO₃ KURT FREDRICKSON, ALEX DEMKOV, Univ of Texas, Austin — We theoretically investigate the interface between a ferroelectric BaTiO₃ film and a nonpolar insulating SrTiO₃ substrate. We find that thin BaTiO₃, under 5 nm, can stabilize two polarization states. While the nonpolarized state is insulating, for the polarized heterostructure, we discovered the existence of two-dimensional gases. In this case, the heterostructure undergoes an electronic reconstruction in order to prevent the polar catastrophe. The two-dimensional gases, formed as a result, screen the polarization, leading to a substantially reduced potential drop across the ferroelectric film. We emphasize that the two-dimensional electron and hole gases are created by the polarization of the sample, and is not due to the polar nature of either material or doping.

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