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Ferroelectric Modulation of Two-dimensional Electron Gas Conductivity at Oxide Interfaces WENXIONG ZHOU, JUN ZHOU, KUN HAN, SHENGWEI ZENG, ZHEN HUANG, THIRUMALAI VENKATESAN, ARIANDO ARIANDO, Natl Univ of Singapore, NUSNNI-NANOCORE, NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE 117411 TEAM, DEPARTMENT OF PHYSICS, NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE 117542 TEAM, DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING, NATIONAL UNIVERSITY OF SINGAPORE, SINGAPORE 11757 TEAM — In this report, by inserting a ferroelectric $Ba_{0.2}Sr_{0.8}TiO_3$ layer between $LaAlO_3/SrTiO_3$ heterostructure, a two-dimensional electron gas (2DEG) was found at $LaAlO_3$/ $Ba_{0.2}Sr_{0.8}TiO_3$ interface. With electrical, optical, piezoresponse force microscopic measurements and first-principle calculations, we studied the impact of this ferroelectric $Ba_{0.2}Sr_{0.8}TiO_3$ layer on the 2DEG. Both carrier density and mobility of the 2DEG can be modulated by changing the thickness of the ferroelectric layer. We also observed that $Ba_{0.2}Sr_{0.8}TiO_3$ layer can suppress oxygen vacancy formation, leading to observation of temperature-independent polarization-induced carrier density. These results indicate that the 2DEG at oxide interfaces can be ferroelectrically modulated.

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