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Bipolar surface conduction of $BaTiO_3$ in ultrahigh vacuum corresponding to electron and hole accumulation YUKIO WATANABE, YOSUKE URAKAMI, MIZUKI YAMATO, Kyushu University — The surface of the ferroelectric is unique due to the spontaneous polarization. One of such properties is a self-field effect [1,2]. We have reported the self-field effect of $BaTiO_3$ [2,3], which does not seem to be accepted, probably due to the suspicions about the formation of the oxygen vacancies or water absorption at the surface in ultrahigh vacuum. Here, oxygen vacancies in $BaTiO_3$ facilitate n-type conduction. In this talk, we present the enhancement of both n- and p-type surface conduction in 10^{-10} –10^{-11} torr. We observed this in both top-seed-solvent-growth (TSSG) and KF-flux grown samples that are nominally pure and transparent. Furthermore, we confirmed the evident reduction of surface conductance above Curie temperature, where it agreed with the conduction without a carrier surface layer. The significant reduction of the conduction by the exposition of the surface to the low vacuum indicates that the conduction occurs really at the very thin layer at the surface. Other several experiments verify the existence of the surface carrier layer by the ferroelectric self-field (depolarization field) effect. [1] Appl. Phys. Lett.66, 1770(1995), Phys. Rev. B57, 789(1998), [2] *Phys. Rev. Lett.* 86, 332(2001), [3] Focus http://focus.aps.org/story/v7/st1

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