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Modulation of Superconductor-Insulator Transition in $NdBa_2Cu_3O_{7-x}$ through Oxygen Migration by Electrolyte Gating LINGCHAO ZHANG, S.W. ZENG, D.Y. WAN, K. HAN, L.K. JIAN, A. ARIANDO, T. VENKATESAN, NATIONAL UNIVERSITY OF SINGAPORE, NUSNNI-NANOCORE TEAM — The technique of electric double layer transistor (EDLT) has been applied to several HTS, such as LSCO and YBCO. The interpretation of SIT in all these studies are attributed to electrostatically induced carriers. However, in several electrolyte gating experiments recently, the effect is mainly attributed to oxygen vacancy formation, with migration of oxygen from the film into ionic liquid. In this study, the modulation of SIT is performed in a 7uc NBCO EDLT. By applying positive V_g, the SC NBCO gradually transits to insulating. When V_g changes back to 0V, it remains insulating. If the mechanism is electrostatically induced carriers, it should recover SC. However, it is only when applying a reverse negative V_g that it can gradually recover SC. Meanwhile, after SIT and V_g back to 0V, another sample is taken out from PPMS. After careful remove of ionic liquid, it remains insulating. After annealing at O_2 atmosphere, it recovers SC. These strongly support the underlying mechanism is oxygen migration, instead of electrostatically induced carriers. The R_c is extracted to be about 5320Ω, suggestive of quantum phase fluctuation.

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