Nonvolatile resistive switching at perovskite oxide interfaces

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Recently, reversible resistive switching between two or multilevel resistance states has been found in capacitor-like devices composed of a wide variety of insulating or semiconducting transition metal oxides [1]. The resistive switching attracts considerable attention due to the potential for device application such as resistance random access memory (ReRAM). The resistive switching behavior reported so far seems to differ depending on the materials consisting of the devices. Therefore, one can expect that the driving mechanism involved in the resistive switching depends on the materials. Some possible mechanisms have been proposed through detailed experimental and theoretical studies, and the proposed mechanisms can be classified into two types: filament or interface types [1].

In this talk, we focus on interface-type resistive switching and describe recent advances in our understanding of the mechanism obtained from study on the devices composed of *p*-type and *n*-type semiconducting oxides such as $Pr_{0.7}Ca_{0.3}MnO_3$ (PCMO) [2,3] and Nb-doped $SrTiO_3$ (Nb:STO) [4,5], respectively. We demonstrated that the resistive switching takes place at the Schottky-like interface between metal electrode and perovskite oxides, and that the density of oxygen vacancies plays an important role in the bistability in the resistance. A possible mechanism is electrochemical migration of oxygen vacancies in the vicinity of the interface.

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