

## SrTiO<sub>3</sub> 抵抗スイッチング挙動と Nb ドーピングの関係

### The impact of Nb doping on the resistance switching of SrTiO<sub>3</sub>

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Among semiconducting oxides, niobium doped strontium titanate (SrTiO<sub>3</sub>) is a novel n-type semiconductor. Metal Schottky contacts on Nb-doped SrTiO<sub>3</sub> exhibited resistive switching phenomena during electrical stressing. It is speculated that the resistive switching in SrTiO<sub>3</sub> is driven by oxygen vacancies. Recently, we have found that switching behavior in SrTiO<sub>3</sub> was greatly affected by the doping level of Nb as shown in Fig.1. It should be noted that the variation in Nb concentration may cause the difference in dislocation density and their electrical property as revealed by EBIC shown in Fig. 2. In this study, the impacts of oxygen vacancies and dislocations on resistive switching were studied by comparing the switching behaviors of as-prepared and air-annealed crystals with different doping levels of Nb. The switching behaviors were analyzed based on *I-V* testing. The electrical activities of dislocations were studied by EBIC method. The dislocation character was analyzed by TEM. It has been found that both oxygen vacancies and dislocations may have effect on switching depending on doping level. The switching was dominated by oxygen vacancies for low doping, while exists other factors for high doping.

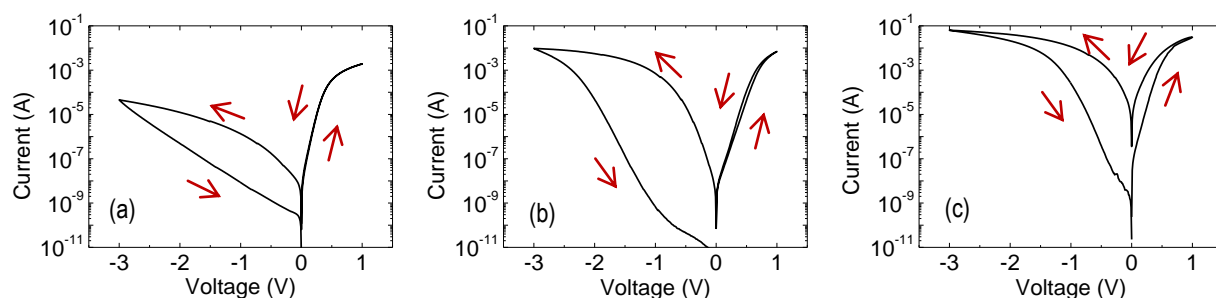


Figure 1. *I-V* curves of Pt/SrTiO<sub>3</sub> Schottky undergoing dual bias sweep. The doping concentration of Nb varied from 0.01% (a), 0.05% (b) to 0.5% (c). Large hysteresis appeared in the sample with Nb of 0.05%.

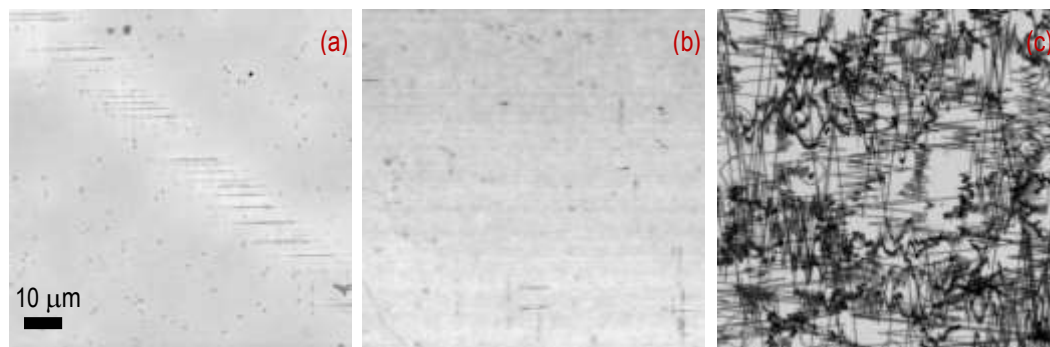


Figure 2. EBIC images of dislocations in Pt/SrTiO<sub>3</sub> Schottky contacts with different doping concentrations of Nb. (a) 0.01%; (b) 0.05%; (c) 0.5%.