

A study of electrical transport and forming effect in Nb₂O₅ film by means of FIB-SEM

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We have investigated current characteristics of Nb₂O₅, the resistance switching material, in terms of temperature. Fundamentally, Nb₂O₅ has structure of MIM (Metal(Pt)/Insulator(Nb₂O₅)/Metal(Pt)) and the characteristic of reversible resistance. Nb₂O₅ has three type different current levels-the Low Resistance State (LRS or ON state), the High Resistance State (HRS or OFF state) and initial state, respectively. We observed current property of Pt/ Nb₂O₅/ Pt from room temperature to 7K. As temperature is decreased, while the LRS current increase as metallic property, the HRS current decreases and then saturates at a certain value. Also, to analysis of filamentary¹⁾ conduction path in Nb₂O₅ film by forming effect, images of cross section in Nb₂O₅ were scanned after forming by using Focused Ion Beam Scanning Electron Microscope(FIB -SEM) with *in-situ* IV measurement system, and we discovered the metallic path by forming process, clearly.

1) M. J. Rozenberg, I. H. Inoue, Bae Ho Park and M. J. Sznchez. Phys. Rev. Lett. **92**, 17 (2004)