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Resistance Switching Behavior in Epitaxial NiO Films SEUNG RAN LEE, JINO LEE, KOOKRIN CHAR, Seoul National University — Recently NiO has attracted great attention due to its potential applications for nonvolatile ReRAM devices. However, the mechanism of resistance switching has not been clearly elucidated and it still remains controversial. To understand the phenomena in resistance switching, epitaxial film can serve as a good model system. Epitaxial films show atomically flat surface as well as good crystallization with much fewer defects which have been considered to be responsible for resistance switching behavior in polycrystalline NiO (poly-NiO). For these purposes we have grown epitaxial NiO (epi-NiO) films on SRO films prepared on (100) STO by pulsed laser deposition systems. XRD pattern shows clear (200) NiO peaks, which means our films are well crystallized with minimal defects. We also analyzed AFM and TEM images of SRO/NiO/Pt, which show clean and atomically flat interface between each layer. I-V characteristics of epi-NiO show an asymmetric shape and bipolar switching behavior. No abrupt current increase at ambient voltage was found, which is considered to be a necessary process for resistance switching in poly-NiO. These results suggest that unidentified defect states and/or interfaces play an important role in resistance switching phenomena. In order to understand the role of defects and interfaces further, our efforts to control the density of defect states and correlate them with I-V characteristics will be presented.

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