

## A study on the oxide diode as a switch element fabricated at room temperature

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Oxide diode had been studied as ultra violet photo detectors, ultra violet light emitting diodes, and transparent field effect transistors due to their transparency. These transparent oxide semiconductors (TOS) are suitable for the fabrication of an optoelectronic device. Recently oxide diode has been developed as a switch element for nonvolatile memory. Silicon based transistor have been the most popularly used switch element. However, silicon based transistor do not conform to high density, nonvolatile memories with three dimensional(3D) stack structures due to their high processing temperatures and the difficulty of growing high quality epitaxial silicon over metals[1]. We have fabricated an oxide p-n diode from p-type NiO and n-type ZnO films deposited at room temperature. This diode structure provides a high rectifying ratio of  $10^3$  at  $\pm 3$  V. This oxide diode as a switch element was fabricated using a pn-heterojunction diode composed of oxide semiconductors. The electrical properties of this nickel oxide and zinc oxide layer were investigated by Hall Effect measurement and those of the nickel oxide/zinc oxide junction by current-voltage (I-V) measurement. The diode exhibited a clear rectifying I-V characteristic and forward threshold voltage of  $\sim 2$  V.

### Reference

- [1] M.-J. Lee, S. Seo, D.-C. Kim, S.-E. Ahn, D. H. Seo, I.-K. Yoo, I.-G. Baek, D.-S. Kim, I.-S. Byun, S.-H. Kim, I.-R. Hwang, J.-S. Kim, S.-H. Jeon, B. H. Park, *Advanced Materials*, **19**, 73 (2007)