Analysis of resistive switching characteristics of nickel oxide in ITO/NiO/ITO structure

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Recently, resistance random access memory (ReRAM) has attracted much attention in transparent electronics devices due to its simple structure and stable memory switching characteristics. This switching characteristics of transition metal oxide (TMO) thin films demonstrate high potential for applications in high operation speed and high-density of next-generation nonvolatile memory devices. It is also generally accepted that indium tin oxide (ITO) thin film is one of strong candidates for transparent conductive oxide (TCO) and n-type semiconductor oxide electronics.

In this study, we fabricated NiO devices which show the bipolar resistive switching behaviors. By using the ITO as top and bottom electrodes, transparent and flexible device of ITO/NiO/ITO structure was prepared. The migration of oxygen ions in the thin film can be controlled for the negative bias applied to the top electrode, which is testified by transmission electron microscopy and Auger electron microscopy. The resistive switching properties according to the distribution of oxygen ions at the NiO interfaces are analyzed.

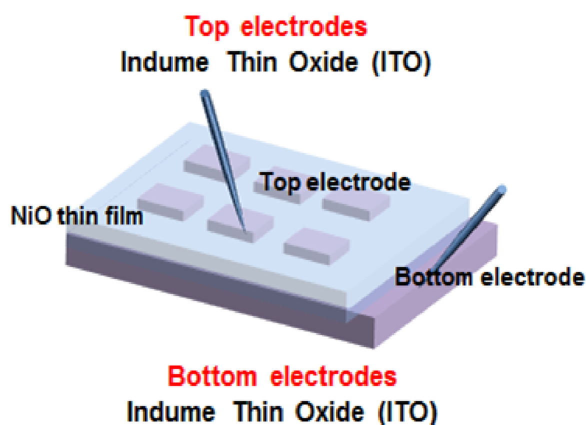

Fig. 1. schematic of ITO/NiO/ITO structure