Fabrication and Switching Characterizations of Copper Oxide Thin Films for Applications in Resistive Random Access Memory Devices

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Abstract. Many nonvolatile memory devices such as, ferroelectric random access memory (FeRAM), magnetic random access memory (MRAM), ovonic universal memory (OUM), and resistive random access memory (RRAM) were considerable discussed and investigated. For these nonvolatile memory devices, the RRAM devices will play an important role because of its non-destructive readout, low operation voltage, high operation speed, long retention time, and simple structure. The RRAM devices were only consist of one resistor and one corresponding transistor.

In this study, the CuO thin films deposited on ITO/glass and Pt/Ti/SiO2/Si substrates for applications in RRAM devices were produced and investigated. The optimal sputtering conditions of as-deposited CuO thin films were the rf power of 80 W, chamber pressure of 20 mTorr, substrate temperature of 580°C, and an oxygen concentration of 40%. The basic mechanisms for the bistable resistance switching were observed. The electrical and physics properties of CuO thin films for applications in RRAM devices were discussed.

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