Sharp Develops Basic Technology for RRAM, Next-Generation Nonvolatile Memory

13 December 2006

Sharp Corporation has developed basic technology for a novel high-speed programming system for RRAM (Resistance Random Access Memory), a next-generation nonvolatile memory capable of programming data at rates about 100 times faster than flash memory.

Based on collaborative research with the National Institute of Advanced Industrial Science and Technology, an independent administrative agency of the Japanese government, these results are the first step toward the practical use of this memory technology. Further R&D, including IC integration and microfabrication technologies, will continue in the future aimed at bringing a commercially viable product to market.

RRAM is a memory device in which electrical resistance changes of a metal oxide film are functioned as the stored information, and this device can be operated with low voltages and at high speeds. There are high expectations for RRAM to be a next-generation memory that will enable large amounts of data to be programmed into memory at high speeds with low power consumption. However, it is not yet clear how resistance changes work in the metal oxide film, the key component of RRAM, and achieving a memory device that takes full advantage of the outstanding characteristics of RRAM has proven difficult.

In collaborative research with the National Institute of Advanced Industrial Science and Technology, Sharp has focused on resistor constituents other than the resistor components where the information of the RRAM memory devices is stored. The resistor constituents, which had not previously been controlled, were set to the different values when data is programmed and erased.

As a result, the company has achieved a High-Speed Unipolar Switching. Programming and erasing RRAM had previously required a positive and a negative power source, but this Sharp development makes these operations possible using a single power supply. The result is memory elements that function using simple circuit architecture. Dramatically simplifying the cell structure of the RRAM, which can program data at high-speeds and low power consumption, makes it possible to reduce the cell size. This technology also uses materials that are highly compatible with conventional CMOS processes, allowing existing production lines to be used.

Source: Sharp