[P-30]

Phase transformation behaviors of SiO_2 doped $Ge_2Sb_2Te_5$ films for application in phase change random access memory

Seung Wook Ryu, Jin Ho Oh, Jong Ho Lee,
Cheol Seong Hwang and Hyeong Joon Kim

School of Materials Science & Engineering, Seoul National University, Seoul, Korea,
TEL: 82-2-880-7168, FAX: 82-2-874-7626, E-mail: tazryu78@snu.ac.kr

Phase change random access memory (PCRAM) has attracted a great deal of interest, not only because it satisfies the various demands for non-volatile memory devices, but also because its fabrication process is relatively simple.[1-3] PCRAM uses the reversible phase change between the crystalline and amorphous state of chalcogenide materials, such as $Ge_2Sb_2Te_5$ (GST), brought about by joule heating. Crystalline GST has a low resistivity while amorphous GST has a high resistivity, which correspond to the "0" and "1" states in the memory devices, respectively.

The improvement in the phase change characteristics of $Ge_2Sb_2Te_5$ (GST) films for phase change random access memory applications was investigated by doping the GST films with SiO_2 using co-sputtering at room temperature. As the sputtering power of SiO_2 increased from 0W to 150W, Crystallization temperature and the activation energy for crystallization increased from 2.1eV to 3.3eV. SiO_2 inhibited the crystallization of the amorphous GST films, which improved the stability of amorphous phase as meta-stable state. that contributed the long term stability of device. The melting point decreased with increasing concentration of SiO_2 which reduced the power consumption as well as the reset current.

* *This work was supported by the Ministry of Commerce, Industry and Energy (MOCIE), and the Ministry of Labor (MOLAB) through the fostering project of the Lab of Excellency.*