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Electrical Characteristics of PRAM Cell with Nanoscale Electrode Contact Size

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Low power consuming operation of phase-change random access memory (PRAM) can be achieved by confining the switching volume of phase change media into nanometer scale. Ge2Sb2Te5 (GST) is one of the best materials for the phase change random access memory (PRAM) because the GST has two stable states, namely, high and low resistance values, which correspond to the amorphous and crystalline phases of GST, respectively. However, achieving the fast operation speed at lower current requires an alternative chalcogenide material to replace the GST and shrinking the dimension of programmable volume.

In this paper, we have fabricated nanoscale contact area on Ge2Sb2Te5 thin films with trimming process. The GST material was fabricated by melt quenching method and the GST thin films were deposited with thickness of 100 nm by the electron beam evaporation system. As a result, the reset current can be safely scaled down by reducing the device contact area and we could confirmed the phase-change characteristics by applying voltage pulses.

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