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## Si1-x Gex nanocrystals based flash memory

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### Abstract:

In the last years semiconductor's nanocrystals (NCs) have attracted a strong attention of many researchers mainly due to their size-dependent optoelectronic properties. Si, Ge, and their alloy nanostructures embedded in dielectric matrices have been a subject of huge interest due to their potential applications in nanoelectronics and optoelectronics, as well as floating gate memory structures [1, 2]. The distribution of NCs and their structural properties dramatically affect performance and reliability of NCs based devices. In these frames an investigation of a correlation between structural and electrical properties is an important task.

In this work, we have studied the structural properties of Si1-xGex NCs embedded in SiO2 matrix grown by RF-magnetron sputtering technique on Si (100) substrate under different conditions with subsequent post growing annealing in nitrogen atmosphere. The lateral size, shape and distribution of Si1-xGex NCs in silica matrix were investigated by means of grazing incidence small angle scattering (GISAXS). A mechanism of electronic transport in SiO2/Si1-xGex/SiO2 devices was investigated by current-voltage (I-V) measurements.

Memory effect was shown by capacitance- voltage (C-V) and retention time measurements at low sweeping voltage shift (up to ±3V). We have been able to relate electrical behavior with the structural properties [3 - 5].

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