

Nickel Nanocrystals Embedded in Metal - Alumina - Nitride - Oxide - Silicon
Type Low-Temperature Polycrystalline-Silicon Thin-Film Transistor
for Low-Voltage Nonvolatile Memory Application
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Abstract

In this work, a nickel nanocrystal (Ni-NC) assisted metal - alumina - nitride - oxide - silicon (MANOS) thin-film transistor (TFT) nonvolatile memory (NVM) was fabricated by a standard low temperature polycrystalline silicon (LTPS) TFT process. The size range and density of Ni-NCs were approximately 5 - 13nm and $5 \times 10^{11} \text{ cm}^{-2}$, respectively. The programming/erasing (P/E) voltages are decreased down to -10 and +8 V, respectively, by the Fowler - Nordheim tunneling mechanism from gate injection. In this P/E voltage condition, a large memory window (4:2 V) was observed by current - voltage measurement. Then, the speed and voltages of P/E were measured and discussed completely. The data retention of the Ni-NC assisted MANOS-LTPS-TFT-NVM is extracted to be 1.62 V of memory window after 10⁴ s.

Keyword : nickel nanocrystal and thin-film transistor