

ASIC² Project: New Non volatile Memory Technologies

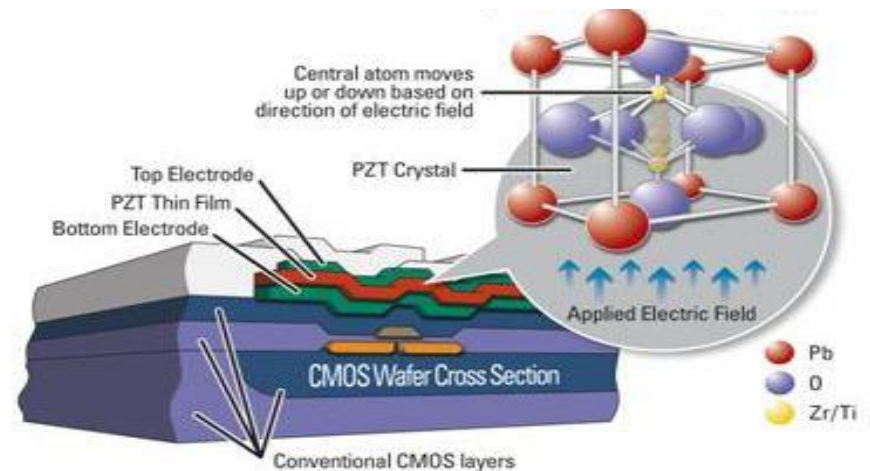
FRAM Versus ReRAM

Background: Nonvolatile memories that have traditionally been ROM (read only memory) until the advent of floating-gate technology. Floating-gate technology produced electrically erasable memories such as flash and EEPROM. These products allow for in-system programming but read and write access times are dissimilar. In fact, the write access times can be several orders of magnitude greater than the read access times. Ferroelectric random access memory or F-RAM is a true nonvolatile RAM because it combines the advantages of both RAM and nonvolatile memory. The write advantages over flash/EEPROM and nonvolatility make it quite suitable for storing data in the absence of power.

Resistive random access memory. A form of non-volatile memory in which a pulse voltage is applied to a metal oxide thin film, creating massive changes in resistance to record ones and zeros. With a simple structure of metal oxide placed between electrodes, the manufacturing process is very simple, while still offering such excellent features as low power consumption and fast write.

Project Description:

- Study the theory of Ferroelectric RAM and Resistive RAM
- Study the SPI and I²C interfaces
- Using available Libraries write an interface on FPGA to standard Serial RAM
- Design and make a circuit including a FRAM and a RRAM
- Connect the circuit to the FPGA and debug the interface
- Compare FRAM and RRAM performances by means of throughput and Magnetic Field Immunity.
- Propose a FRAM an RRAM applications and demonstrate feasibility.



Prerequisites: TBD

Recommended: TBD

Supervisor: Eric Herbelin,
ericherbelin@ee.technion.ac.il