Chapter 5

Conclusions

In this thesis, first, we have proposed a new SONOS-type memory structure with SiGe channel for low temperature process, reproducible, reliable technique with high-k material HfO_2 trapping layer. From the experiment results, the carrier injection rate can be improved with SiGe channel for low energy band gap. In addition, it has good characteristics in terms of low operation voltage, large memory window, high program/erase speed and good retention in room temperature.

Next, we use $HfSiO_X$ silicate trapping layer for the trapping layer in our flash memory with simple, low temperature process, reproducible and reliable technique for high density charge storage. From the experiment results, first, the carrier injection rate can be improved with SiGe channel. Second, high density HfO_2 nanocrystal can improve retention and endurance characteristics. Good characteristics in terms of large memory window, high speed program/erase, good retention, endurance and 2 bit operation can be achieved.

Finally, we have explored the memory effect on the performance of the p-channel HfO_2 nanocrystal trapping layer of SONOS type flash memories with characteristics in terms of large memory window, high program/erase speed and good retention.