Chapter 4

Conclusions

Oxynitrides with high nitrogen content distributed close to the surface are considered to be the best candidates for 65 nm CMOS integration or below. We propose an alternative approach for forming a high-nitrogen ultrathin oxynitride gate dielectric is demonstrated. The oxynitride growth included three process stages－chemical oxide growth, nitridation and subsequent dry oxidation. Meanwhile, chemical oxide as a starting oxide can provide a better controllability in film thickness. Following that, the chemical oxide was nitrided using a furnace in low-pressure NH_3 ambient to transfer high-nitrogen oxynitride. The nitrided chemical oxide was then placed in atmospheric O_2 ambient to form a robust oxynitride. The process proposed here is simple and fully compatible with current process technology.

Finally, by this technique, nMOSFET of oxynitride were fabricated to study electrical characteristics. They demonstrate excellent properties in terms of low leakage current, high driving current、mobility and gm, high endurance in stressing, superior boron diffusion blocking behavior and weak SILC effect, and good performance in HCI effect.