

CHAPTER 5

CONCLUSION

5.1 Summary

Isolation process nowadays, becomes very important to semiconductor industry due to increasing of technology. The main idea is to build transistors on the same substrate that are electrically isolated from each other. The primary purpose of any isolation structure is to electrically isolate devices from one another. All LOCOS and modified LOCOS isolation structures use Si_3N_4 as a masking layer against oxidation.

The main purpose of this project is to study the effect of the bird's beak using electron beam lithography. In this project, the result just refers to the composition of oxide that measured using (EDX). Based on the fully-recessed LOCOS result shows, that the composition of oxide for 300 Å pad oxide is 6.90 % and for the 400 Å pad oxide the composition of oxide is 10.02 %. That means, the thicker the pad oxide the greater the oxygen beneath under nitride layer. According to the result, observation is done in just varies on pad oxide. So, the thickness of nitride layer is not taken to the account. For the poly-buffered LOCOS shows that the composition of oxide for 400 Å that beneath under polysilicon layer is 5.02 % and for 500 Å is 8.95 %. Based on the result shows that the thicker the pad oxide the greater the molecules oxygen diffuse under polysilicon layer.

During poly-buffered process, there some problem occurred whereby, the sheet of resistance for polysilicon is not matching with the range of polysilicon. This problem occurred after annealing process which is to convert the amorphous layer to the polysilicon layer. There a lot of defect existed on the polysilicon layer after observation using a low power microscope. In this case, the process is continued because to get the value of the sheet resistance for poly is very difficult. But, the performance of the result is degrading due to the circumstances problem. For the poly-buffered LOCOS the aim objective is same as fully-recessed LOCOS to measure the composition of oxide that diffuse under polysilicon layer. Overall this project shows that the better result is obtained using poly-buffered LOCOS compared with the fully-recessed LOCOS.

Due to the availability of an oxidant diffusion path under the nitride and polysilicon mask (the pad oxide), lateral oxidation can take place. The lateral encroachment, also called the bird's beak, can be characterized by a length in semi-recessed structures. In fully recessed structures, where a shallow trench is etched into the silicon before field oxidation, the length parameters are needed to fully describe the amount of oxide that diffuse under the nitride layer.

5.2 Recommendation for future project

There are some recommendation to improve the future project have been suggested.

- 1) University Malaysia Perlis should provide a low pressure chemical vapor deposition (LPCVD) whereby, this equipment still not available. Obviously, University Malaysia Perlis have a lot of advanced equipment, but to compete with another university there should come up with the latest equipments to become first class university in the world. So, the better result will be obtained by student if this problem is overcome.

- 2) University Malaysia Perlis should give chances to student's to make collaboration with the industry in order to make their final project. Although, the student have undergone practical training but with the added of this suggestion can give more exposure to student. This approach gives a lot of benefits to student to build an experience with handling the industry equipment. So, the student also can co-relate what there have learned in university and adapt the knowledge to the industry. This valued experience is very importance to student to become more confidence to compete in the real working environment.