

Semiconductor Process (EB68684)

Report 2 Assignment

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■ How & When to submit your report :

1. Electronic submission: Submit your report in PDF via E-mail to leedevicelab@gmail.com

2. Deadline: Oct. 24, 2019

■ Answer the questions (problems) of the Chapter 3 with explanations and/or calculations:

Chapter 3: Thermal Oxidation of Silicon (2nd elementary process)

Problem 3-1: Explain the definition of the thermal oxidation of Silicon in terms of thermo-dynamically chemical reaction and related chemical formula about two different types (i.e. dry and wet).

Problem 3-2: In order to derive the equation of the oxidized thickness as a function of time and temperature, we employ the Fick's first law of diffusion. Here, why the diffusion is the key physical mechanism for the thermal oxidation.

Problem 3-3: In the derived equation of oxidized thickness, there are two parameters /constants. Explain what they are, and how to extract them from the experiments.

Problem 3-4: Explain why the oxidation effectiveness is different from the crystal orientation of Silicon, and why the linear rate constant is changed rather than the parabolic rate constant.

Problem 3-5: Explain the difference between the oxidation and oxide film deposition.

Problem 3-6: A <111> silicon wafer has a 2000-Å oxide on its surface. Now, solved the problems below graphically as well as mathematically:

(a) How long did it take to grow this oxide at 1000° C in wet oxygen?

(b) The wafer is put back in the furnace in dry oxygen at 1200° C.

How long will it take to grow an additional 3000 Å of oxide?

Problem 3-7: Explain the difference between the Dry and Wet oxidation in terms of Pros and Cons.

Problem 3-8: Compare the classical Local field oxide (LOCOS) and recessed one.

Problem 3-9: Explain the advantage and disadvantage of the Deep trench isolation.

Problem 3-10: Explain the CMP process briefly.