

Oxide Growth

Pre-Lab Assignment

1. Compare wet oxidation and dry oxidation in terms of process, growth rate, performance reaction and results.
2. Describe the use of oxide layers in semiconductor industry.
3. Why does the semiconductors industry mainly use silicon as substrate instead of other elements (Hint: focus on the oxidation process and thermal properties).
4. Plot the oxide thickness as a function of time for a silicon wafer inside a furnace for $t \leq 40$ minutes:
 - Initial Thickness = 0 nm
 - Furnace Temperature = 1000°C
 - Wafer crystal orientation = (100)
 - Dry O₂ operation

Oxidation coefficients for dry oxidation of (100) silicon [2]

Temperature (°C)	A (μm)	B(μm²/hr)
800	0.370	0.0011
920	0.235	0.0049
1000	0.165	0.0117
1100	0.090	0.027
1200	0.040	0.045

5. Estimate the time of transition between the reaction- and diffusion-controlled regimes of oxidation.
6. Read carefully the BOE (Buffer Oxide Etch) MSDS. Describe hazards associated with BOE and rules for mitigation of those hazards.
7. Describe other safety hazards in this experiment and rules for their mitigation.