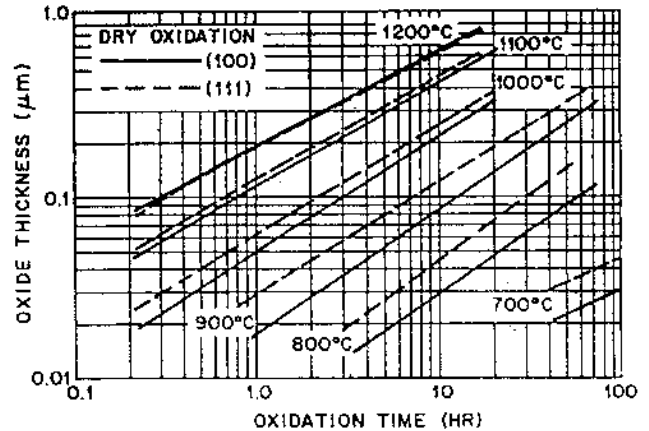
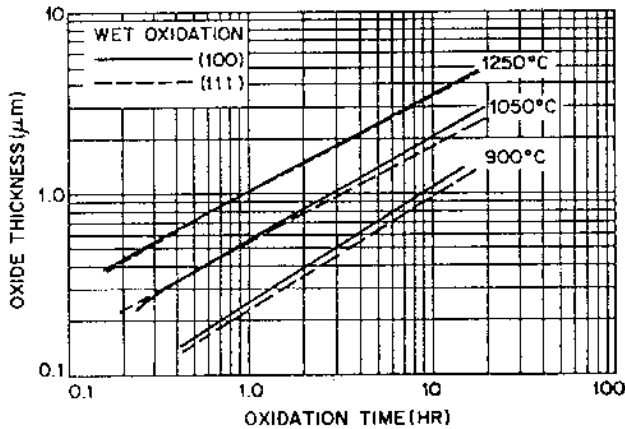


1. How long will it take to thermally grow a 1.5 μm thick SiO_2 film on a (100) substrate at 1000 $^\circ\text{C}$, by (a) wet oxidation, and (b) 0.2 μm dry and then 1.5 μm wet oxidation

How about growing a 2.5 μm thick wet SiO_2 at 1050 $^\circ\text{C}$



2. Can you estimate the residual stress of the SiO_2 film for problem 1, (a) after the substrate is brought outside the furnace ($T = 30\text{ }^\circ\text{C}$)

Thermal expansion coefficients : Si : $2.3 \times 10^{-6}/^\circ\text{C}$, and SiO_2 : $5 \times 10^{-7}/^\circ\text{C}$

Young's modulus : SiO_2 : 60 GPa

3. If the SiO_2 film in Prob. 2 is only grown on one side of the substrate, then the substrate will be deformed like I or II, why?

