1.16. For a Fcc lattice, the 4 atoms

(000) $(\frac{1}{2}\ 0\ \frac{1}{2})$ $(\frac{1}{2}\ \frac{1}{2}\ 0)$ $(0\ \frac{1}{2}\ \frac{1}{2})$

$+$

$(\frac{1}{4}\ \frac{1}{4}\ \frac{1}{4})$

$\Downarrow$

$(\frac{1}{4}\ \frac{1}{4}\ \frac{1}{4})$ $(\frac{3}{4}\ \frac{1}{4}\ \frac{3}{4})$ $(\frac{3}{4}\ \frac{3}{4}\ \frac{1}{4})$ $(\frac{1}{4}\ \frac{3}{4}\ \frac{3}{4})$

2.2. $E = qV = 1eV = 1.602 \times 10^{-19}\ J$

$$v = \sqrt{\frac{2E}{m}} = \sqrt{\frac{2 \times 1.602 \times 10^{-19}\ J}{9.11 \times 10^{-31}\ kg}} = 5.93 \times 10^{5}\ m/s$$

5.3 (a) 1100°C

thickness	time
200 nm	0.13 hr
500 nm	0.61 hr
900 nm	1.8

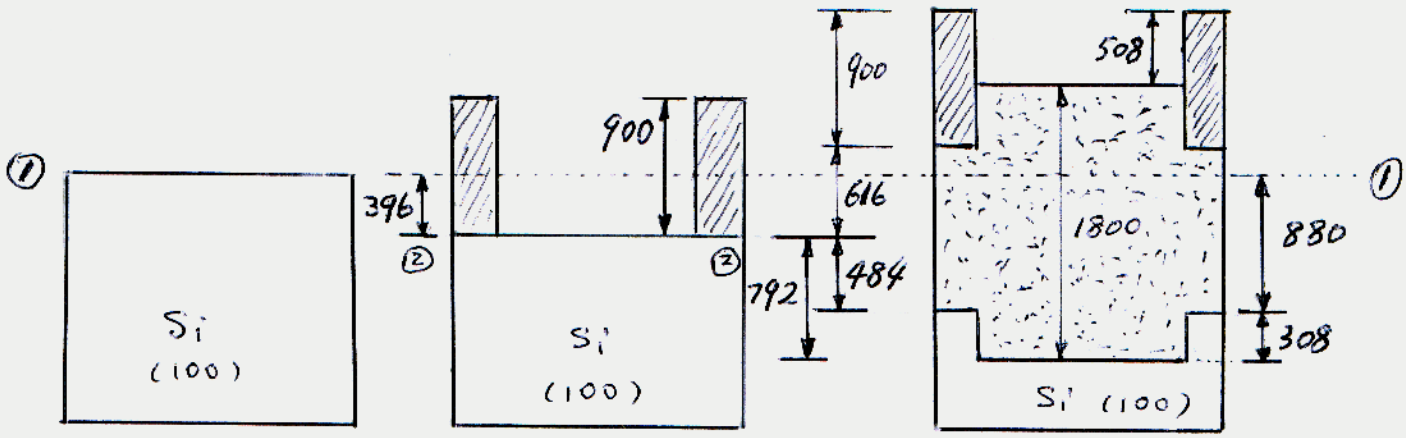
thickness	time
first 200 nm	0.13 hr
next 300 nm	0.48 hr
final 400 nm	1.09 hr

(b) 1150°C wet oxidation

thickness	time
900 nm	1.4 hrs
2000 nm	6.4 hrs
1800 nm	5.0 hrs

thickness	time
first 900 nm	1.4 hrs
next 1100 nm	5.0 hrs
first 1800 nm	5.0 hrs

unit = nm



To grow each μm SiO_2, consumes 0.44 μm Si.

Grow the first 900nm Si, 900 nm x 44% = 396 nm Si has been consumed. So the oxide – Si interface line ② – ② is 396 nm below the reference line ① – ①.

For the oxidation at 1150°C ~~under~~ in wet atmosphere

the oxide growth under 900nm oxide consumes Si

1100 nm × 0.44 = 484 nm

the oxide growth in widow region consumes Si

1800nm × 0.44 = 792 nm

So the new oxide – Si interface step height ~~e~~ is

792 nm – 484nm = 308 nm

the oxide step height is

2000nm + 308nm – 1800nm = 508 nm