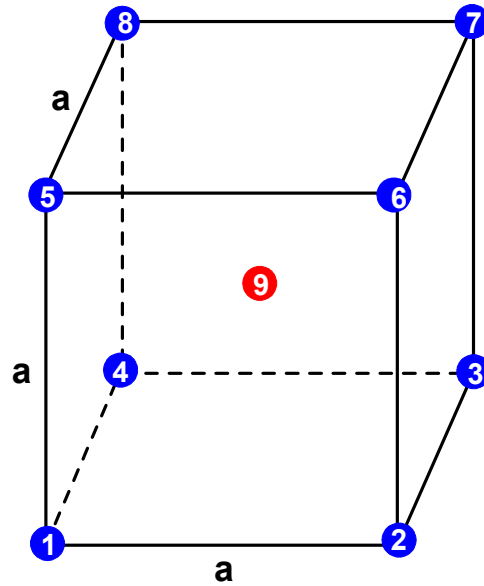


bcc 結構



Body Central Cubic Structure (bcc)

說明：

1. 1~8 號原子在八個角落(原子的 $\frac{1}{8}$ 在內部, $\frac{7}{8}$ 在外部)
2. 9 號原子正中心
3. 1 號和 9 號和 7 號 3 個原子相接觸, 因此 $4r = \sqrt{3}a$, 亦即 $r = \frac{\sqrt{3}a}{4}$

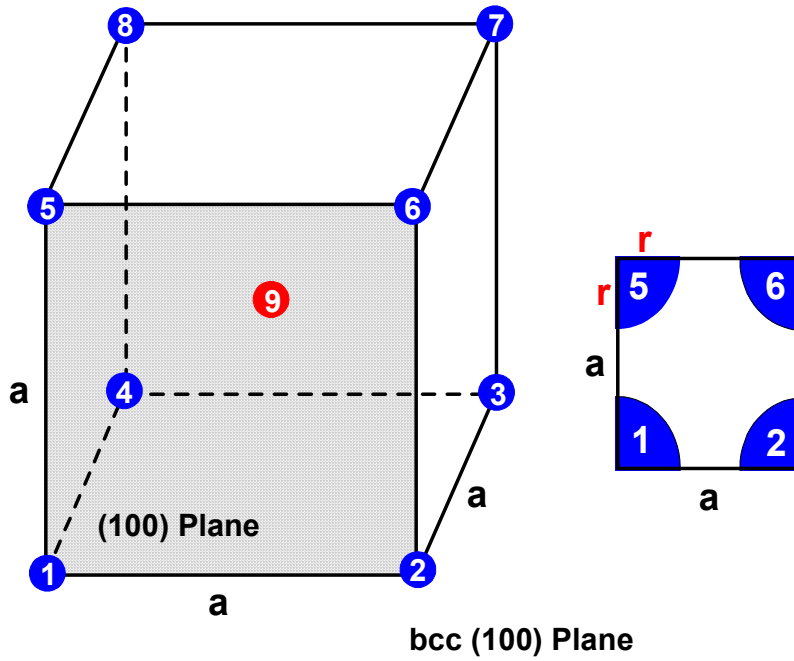
一. 佔滿因子 FF(Filling Factor)的求法：

$$\begin{aligned} FF &= \frac{\left(\frac{1}{8} \times 8 + 1\right) \times \frac{4}{3} \pi r^3}{a^3} \times 100\% = \frac{2 \times \frac{4}{3} \pi \left(\frac{\sqrt{3}a}{4}\right)^3}{a^3} \times 100\% = \frac{8 \times \pi \times 3\sqrt{3}}{3 \times 64} \times 100\% \\ &= \frac{\sqrt{3}\pi}{8} \times 100\% = 68\% \end{aligned}$$

二. (100)面之平面原子密度的求法：

(100)面平面原子密度

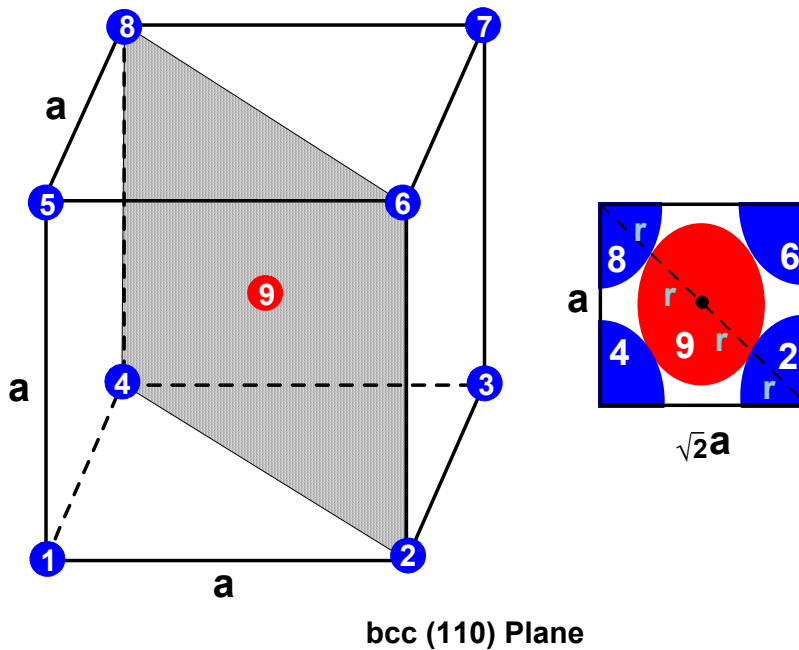
$$= \frac{\left(\frac{1}{4} \times 4\right) \times \pi r^2}{a^2} \times 100\% = \frac{\pi \left(\frac{\sqrt{3}a}{4}\right)^2}{a^2} \times 100\% = \frac{\pi \times 3}{16} \times 100\% = 59\%$$



三. (110)面之平面原子密度的求法：

(110)面平面原子密度

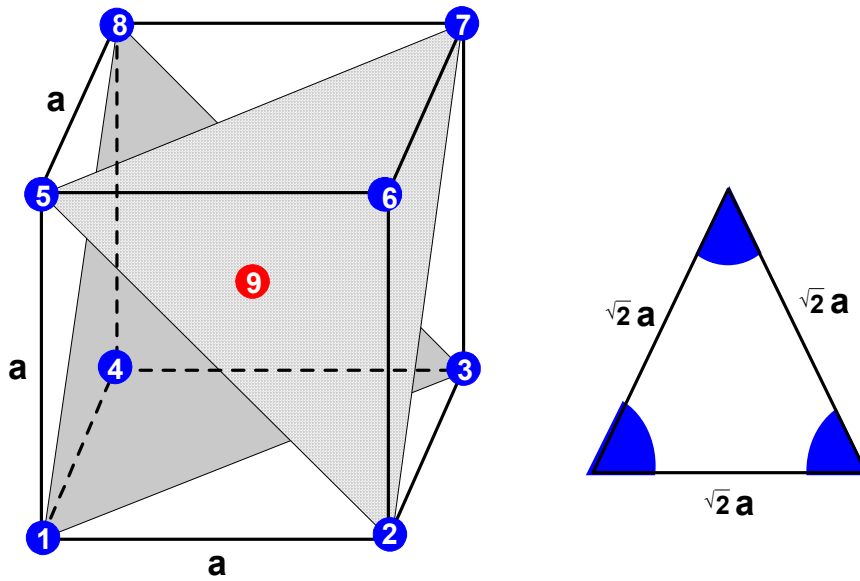
$$\begin{aligned}
 &= \frac{\left(\frac{1}{4} \times 4 + 1\right) \times \pi r^2}{\sqrt{2}a \times a} \times 100\% = \frac{2 \times \pi \left(\frac{\sqrt{3}a}{4}\right)^2}{\sqrt{2}a^2} \times 100\% = \frac{2 \times \pi \times 3}{16 \times \sqrt{2}} \times 100\% \\
 &= \frac{3\pi}{8\sqrt{2}} \times 100\% = 83\%
 \end{aligned}$$



四. (111)面之平面原子密度的求法：

(111)面平面原子密度

$$\begin{aligned}
 & \frac{\left(\frac{1}{6} \times 3\right) \times \pi r^2}{\frac{1}{2} \times \sqrt{2} a \times \frac{\sqrt{6}}{2} a} \times 100\% = \frac{\frac{1}{2} \times \pi \left(\frac{\sqrt{2} a}{4}\right)^2}{\frac{\sqrt{3}}{2} a^2} \times 100\% = \frac{\pi \times 2 \times 2}{2 \times 16 \times \sqrt{3}} \times 100\% \\
 & = \frac{\pi}{8\sqrt{3}} \times 100\% = 23\%
 \end{aligned}$$



bcc (111) Plane