متالورژی پودر پیشرفته

فصل هفتم کتاب درسی RAHAMAN

اصول اولیه زینترینگ

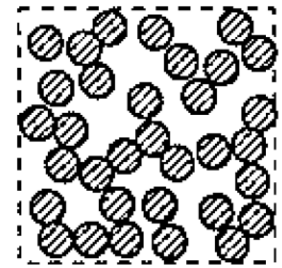**Surface Curvature**

Applied Pressure

Chemical Reaction

$$N = \frac{M}{m} = \frac{1}{V\rho} = \frac{M}{\frac{4}{3}\pi r^3 \rho} = \frac{3V_m}{4\pi r^3}$$
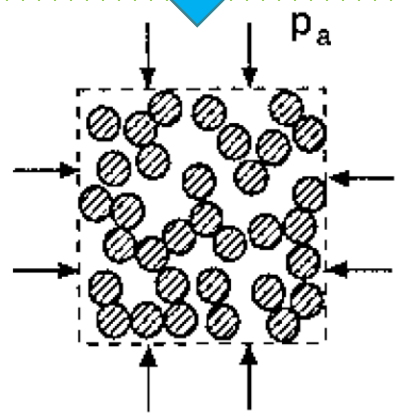
$$W = P_a V_m$$

$$\Delta G^0 = -RTLnKeq$$

$$S_A = N4\pi r^2 = \frac{3V_m}{r}$$

$$E_s = \gamma_{sv} S_A = \frac{3\gamma_{sv}V_m}{r}$$

p_a

Surface
free energy

Applied
pressure
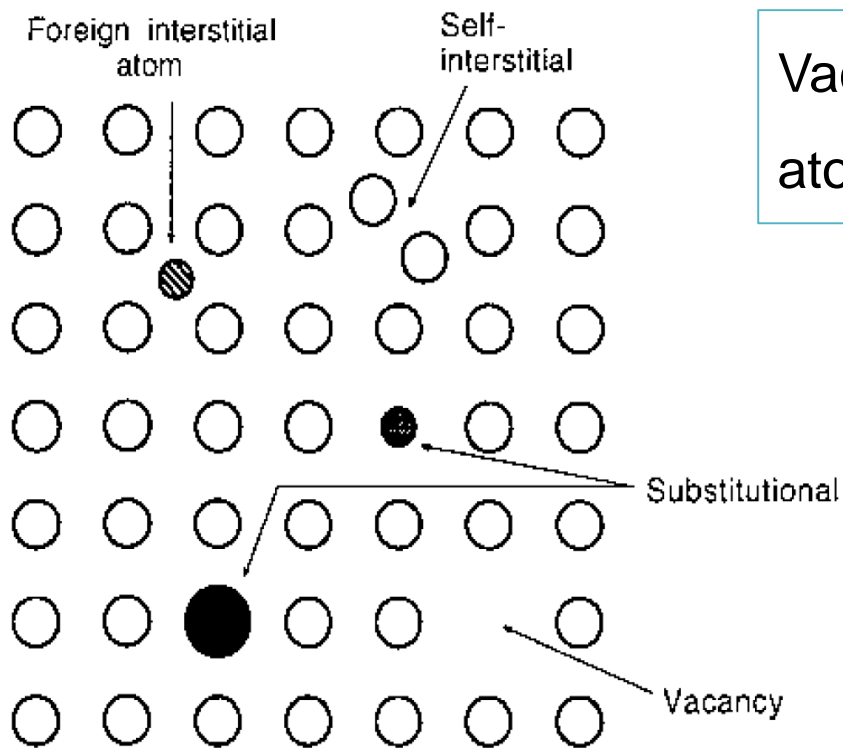
Chemical
reaction

Dense solid
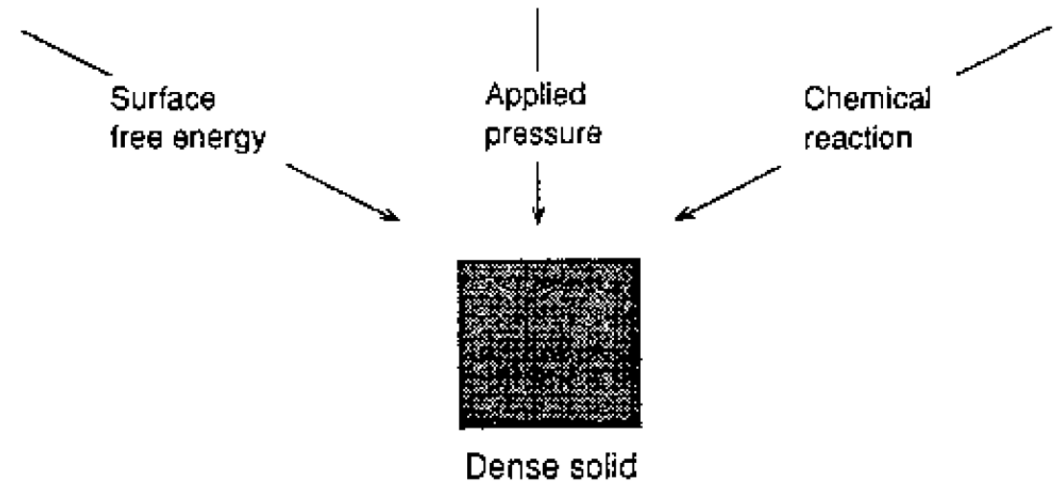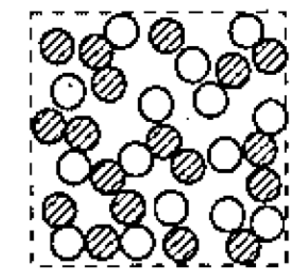
Kroger-Vink Notation

Point defects in an elemental solid

Vacancy = V

atom = atom name

M_L^C

Positive effective charge: C = •

Negative effective charge: C = /

Neutral effective charge: C = x

Interstitial atom = i

Substitutional atom = atom name

Notation	Defect
$Al_i^{\cdots}$	Aluminum ion in the interstitial lattice site
$V_O^{\cdot\cdot}$	Oxygen vacancy
Mg'_{Al}	Magnesium dopant on the normal Al lattice site
$Ti_{Al}^{\cdot}$	Ti dopant on the normal Al lattice site
e'	Quasi-free electron
$h^{\cdot}$	Missing electron or hole

1- Conservation of mass:

2- Electroneutrality

3- Site ratio conservation

$$2MgO \xrightarrow{Al_2O_3} 2Mg_{Al} + 2O_O + V_O$$

$$2MgO \xrightarrow{Al_2O_3} 2Mg'_{Al} + 2O_O^x + V_O^{\bullet\bullet}$$

$$3MgO \xrightarrow{Al_2O_3} 3Mg'_{Al} + 3O_O^x + Al_i^{\bullet\bullet\bullet}$$

$$3MgO \xrightarrow{Al_2O_3} 3Mg_i^{\bullet\bullet} + 3O_O^x + 2V'''_{Al}$$

$$3MgO \xrightarrow{Al_2O_3} 2Mg'_{Al} + Mg_i^{\bullet\bullet} + 3O_O^x$$