

Material Definitions :-

Chapter 1 :-

Composition

Structure

Synthesis

Processing

tetrahedron of material science

Chapter 2:

Atomic number

Atomic mass

Avogadro number

atomic mass unit

Quantum numbers

Pauli principle

Valence Electrons

Electronegativity

Ductility

Modulus of elasticity

Mohs

eV

Primary Bond

Ionic Bond

Covalent Bond

Metallic

Secondary Bond

Intermetallic Compound

Glass temperature

Van der Waals

Interatomic Spacing

Binding Energy

Yield strength

CTE

Chapter 3:-

Short-range order (Amorphous material)

Long-range order (Crystalline material)

Monatomic Gases:

Amorphous Materials

Liquid Crystals

(Glass: short range order)

Crystalline Materials

lattice

Unit Cell

Atomic Radius

Packing factor

Allotropy

Polymerorphism

Miller indices

Linear density

Packing Fraction

Interstitial Sites

Single Crystal

Polycrystalline

lattice parameter

Coordinate number

Repeat distance

Anisotropy

⊕ Cubic site

octahedral site

Tetrahedral site

Covalent structure

Diamond cubic

Definitions

Chapter 4:-

Point defects

Extended defects

Vacancy : P.d

Interstitial defect : P.d

Substitutional defect : P.d

→ Frenkel defect :

→ Schottky defect : Point defect

Interstitialcy

Dislocation

Screw dislocation

Edge dislocation

Mixed ~

slip

Plastic deformation

Elastic deformation

Dislocation density

Schmid's law

Critical Resolved Shear stress

Etch pits

Slip line

Slip band

FCC, BCC Ductile / cross-slip can occur

HCP brittle / ~ can't

Chapter 6:

Stress

Strain

Young's Modulus = modulus of elasticity

Shear Modulus (G)

Viscosity (η) $\frac{\text{shear stress}}{\text{shear strain}}$ Pa-s
Poise

Thixotropic behavior

Load

Strain Gage (Extensometer)

Glass Temperature T_g

Engineering stress

Engineering strain

Breaking strength

Elongation to failure

True Stress

\sim Strain $\epsilon = \ln\left(\frac{l}{l_0}\right)$

Becl Test

Flexural strength (modulus of Rupture)

\sim modulus

Hardness Test

Impact Test

Impact energy

Impact toughness

Fracture toughness

• Fracture strength

• Fatigue limit

• \sim strength

• \sim life

Trod tests

Charpy tests

Ductile to brittle transition temperature DBTT

Notch sensitivity

Fracture mechanics

Fracture toughness

Fatigue

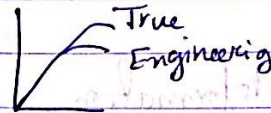
Creep test

\sim Rate

Rupture time

Climb

Beach or clamshell marks
S-N curve (Wöhler Curve)
Rotating cantilever beam test
Anelasticity
Plain stress $\sigma_z = 0$
 $\epsilon_z \neq 0$



Fracture
yield strength
yield stress
Ductility
Tensile strength

- Fracture strength
- Fatigue limit
- \sim strength
- \sim life

Definitions

Ch 9:

Phase

Gibbs phase Rule

P-T diagram

Solubility

Unlimited Solubility

Limited Solubility

Solid solution strengthening

Liquidus temp

Solidus temp

Isomorphous phase diagram

Binary

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~

Ternary

~

~

Segregation

Chapter 10

Dispersion Strengthening

Matrix

Precipitate

Eutectic

Intermetallic compound

Stoichiometric intermetallic compound

Orderly crystal structure

Peritectic

Monotectic

Miscibility gap In Monotectic

Metastable miscibility gap

Solvus

Isopleth

Hypoeutectic alloy

Hyper eutectic alloy

Metastable (in lec notes)

Microconstituent

Ch 7

Frank Read source

Thermoplastics

Cold Work: metal working process in which metal is shaped below its recrystallization temp (contrast with hot working technique)

Warm Working:

Heat affected zone

Hot Working: a process in which a metal is shaped under pressure at a fairly high temp

Superplasticity

Strain Rate