



Satuan Acara Pengajaran

ENMT800002 - Kinetika & Transformasi Fasa

Pengajar

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Tujuan Perkuliahan

Mahasiswa mampu memahami serta menganalisis keseimbangan dan transformasi fasa dalam aspek proses dan aplikasi bidang metalurgi dan material.

Minggu 1

Materi	Introduction (Rules, Grading, Marking) 1. Review on Thermodynamics and Phase Equilibrium: a. Single Component System b. Binary Component System c. The Phase Rule d. Binary Phase Diagrams: - Two phase equilibrium - Three phase equilibrium - Exercise on two phase and three phase equilibrium - Reactions in the solid state
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- Referensi**
1. Porter, D. A and Easterling, K.E, Phase Transformation in Metals and Alloys, 2nd. ed., CRC Press, 2003.
 2. Prince, A, Multicomponent Alloy Constitutional Bibliography, The Metals Society, London, 1978
 3. West, DRF, Ternary Equilibrium Diagrams, Chapman and Hall, 1982
 4. M. Fleming, Solidification Processing, 1974
 5. Campbell, Phase Diagram Understanding the basic, ASM, 2012

Support materials:

1. Chapter 5, 9 and 10 of: Callister, W.D, Materials Science and Engineering: An Introduction, 6th ed., Wiley., 2004
2. Lennart Backerud, Guocai Chai, and Jarmo Tamminen, Solidification Characteristics of Aluminum Alloys-Volume 2: Foundry Alloy
3. Lars Arnberg, Lennart Backerud, and Guocai Chai, Solidification Characteristics of Aluminum Alloys-Volume 3: Dendrite Coherency

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Minggu 2

- Materi**
- e. Fe-Fe₃C Phase Diagram
 - f. Ternary System Representation
 - g. Ternary System containing 2 phase
 - h. Exercise

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Minggu 3

- Materi**
- Diffusion in Materials:
- a. Atomic mechanism of diffusion
 - b. Fick's first law for steady state diffusion
 - c. Interstitial diffusion
 - d. Substitutional diffusion

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Minggu 4

Materi Diffusion in Materials (cont.):
d. Tracer diffusion in binary alloys
e. Diffusion in multiphase binary system
f. Journal review

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Minggu 5

Materi Solution for Fick's 2nd law:
- Homogenization
- Thin film solution
- Carburization and decarburization
- Diffusion from a Finite Source into Semi Infinite Media
- Case studies

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Minggu 6

Materi Crystal Interface and Microstructure (1)
a. Interfacial free energy
b. Grain boundary
c. Case study in Crystal Interface

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Minggu 7

Materi Crystal Interface and Microstructure (2)
d. Interphase interfaces in solids
e. Interface migration

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Minggu 8

Materi Midterm

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Minggu 9

Materi Solidification (1)
a. Nucleation in pure metals
b. Growth of pure solid
c. Solidification of alloy

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Minggu 10

Materi Solidification (2)
d. Application of solidification theory in casting and welding
e. Solidification during quenching from the melts
f. Case study

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Minggu 11

Materi Diffusional Transformation in Solids (1)
a. Homogeneous and heterogeneous nucleation in solids
b. Precipitate growth
c. Transformation kinetics

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Minggu 12

Materi Diffusional Transformation in Solids (2)
d. Eutectoid transformation
e. Ordering transformation
f. Case study

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Minggu 13

Materi Diffusionless Transformation in Solids:
a. Theories of martensite nucleation
b. Martensite growth
c. Tempering of ferrous martensite
d. Martensite transformation in nonferrous metals

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Minggu 14

Materi Diffusionless Transformation in Solids (2)
e. Exercise, Group Discussion
f. Case study in Diffusionless transformation

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Minggu 15

Materi - Class review
- Group Presentation
- Question and answer session

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Minggu 16

Materi Final examination

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