Applied Thermodynamics of Polymer Solutions and Blends

3 credits PhD course in Polymer Engineering curriculum

Amirkabir University of Technology

Chapter 1: Polymer theory and technology development

Chapter 2: Non-Ideality of complex fluids (Soft matter): Chemical, quasi- chemical and physical views

Chapter 3: Modeling of complex fluids: 3.1 two states models, 3.2 Compressible regular solution model, 3.3 Cluster fluid theory, 3.4 Differentiations in free volume occupations, 3.5 Intermolecular interactions and miscibility and 3. 6 Thermodynamic perturbation theories

Chapter 4: Phase diagram of complex fluids: 4.1 Theoretical predictions and experimental results, 4.2 Miscibility and phase coexistence, 4.3 Equation of states and experimental results

Chapter 5: Phase separation in complex fluids: 5.1 Viscoelastic phase separation, 5.2 multistage evolution schemes

Chapter 6: The interplay of bulk and surface thermodynamics: Surface enrichment and bulk thermodynamics

Chapter 7: External fields and thermodynamics of complex fluids: Phase separation induced by stress fields, electrical fields, (3 sessions)

References:

1. **N. Mohammadi, Applied Thermodynamics of Polymer Solutions and Blends, Amirkabir University of Technology, Feb 3, 2019.**
2. **V. J. Klenin, Thermodynamics of Systems Containing Flexible-Chain Polymers, Elsevier, Amsterdam, 1999.**
3. **R. Koningsveld, W. H. Stockmayer and E. Nies, Polymer Phase Diagrams, Oxford University Press, New York, 2001.**
4. **T. Teraoka, Polymer Solutions: an Introduction to Physical Properties, John Wiley, New York, 2002.**
5. **P. G. deGennes, Scaling Concepts in Polymer Physics, Cornell University Press, Ithaca, 1991.**
6. **G. H. Fredrickson; the Equilibrium Theory of Inhomogeneous Polymers, Clarendon Press: Oxford, U. K., 2006.**