

## **Oral Qualifying Exam - Physics and Physical Chemistry of Polymer Liquids**

This exam covers diverse equilibrium physical aspects of synthetic polymers in the liquid phase, including crosslinked rubber networks and liquid crystals.

### **NON-EXHAUSTIVE TOPICAL AREAS**

- Statistical conformation of individual polymer chains; solvent quality; equilibrium behavior of dilute polymer solutions
- Conformation, equilibrium properties and phase behavior of semidilute and concentrated polymer solutions; physical mesh, scaling concepts, Flory ideality concept
- Polymer networks and classical rubber elasticity
- Structure of polymers near surfaces: confined fluids, grafted and adsorbed layers
- Phase behavior of liquid crystal forming polymers; rigid rods, semiflexible chains, thermotropic and lyotropic
- Phase separation of polymer blends; chi-parameter, interfacial aspects
- Block copolymers and microphase separation; ordered phase morphologies

### **LEVEL (BASED ON UIUC COURSES)**

MSE458: Polymer Physical Chemistry

### **STANDARD TEXTS**

- Rubinstein and Colby, "Polymer Physics"
- Sperling, "Introduction to Physical Polymer Science"