



# Colloid Chemistry and Colloidal Dispersions - Fundamentals and Practical Aspects

## Lectures:

### ***Introduction to Colloid Chemistry***

- Nature of the colloidal state and classification
- Brownian motion
- Particle size and shape

### ***Forces in Colloidal Systems***

- Origin of attractive forces
- Hydrophobic forces
- Entropic forces

### ***Colloidal Instability***

- The six different instabilities of colloidal dispersions
- Stabilization of colloidal systems through an osmotic barrier

### ***Colloidal Stability – Charge Stabilization I & II***

- How to introduce charges on colloidal particles
- Theories of stabilization with charge
- Characterization of colloidal particles by electrokinetic measurements

### ***Solvent Properties***

- Solvents other than water

### ***Introduction to Phase Diagrams***

- Phase diagrams of two-, three-, and four components
- Stability, instability and metastability

### ***Surfactants in Solution and Adsorption of Surfactants on Colloidal Particles***

- Self-assembly structures (micelles, bilayers, vesicles)
- Mixtures of surfactants
- Surface and interfacial tension
- Adsorption on solid and liquid surfaces

### ***Polymers in Solution***

- Characterization and properties
- Polymer phase behaviour
- Mixtures of polymers in solution

### ***Adsorption of Polymers on Colloidal Particles - Steric Stabilization***

- Effect of polymer molecular weight and kinetic effects
- Adsorption of polyelectrolytes
- Stabilization of colloids with polymers – steric stabilization
- Flocculation with polymers

### ***Surfactant – Polymer Interaction in Solution and at Surfaces***

- Phase behaviour of surfactant – polymer mixtures
- Adsorption of surfactant – polymer mixtures at surfaces

### ***Preparation of Colloidal Particles/Dispersions***

- Condensation methods
- Dispersion methods

### ***Heterosystems – Stability and Instability***

- Systems with particles and liquid interfaces – suspoemulsions
- Attachment of dispersed particles to interfaces and effects on colloidal stability of emulsions and foams
- Heterocoagulation

### ***Rheological Behaviour of Colloidal Systems I & II***

- Basic concepts and definitions
- Effect of dispersion state and solid content
- Thickeners in aqueous solution
- Viscoelasticity and rheometry techniques

### ***Emulsion and Emulsifiers***

- Emulsion characteristics
- Surfactant choice and the preparation of emulsions
- Mechanisms of emulsion stability and instability **Foams**
- Foam characteristics, preparation and stability
- Foam breaking