

RHEOLOGY OF COLLOIDAL SYSTEMS

Prof. Em. Jan Mewis

Tuesday Nov. 29th

- 9:00 - 9:30 **Registration and coffee**
- 9:30 - 10:00 Introduction: scope & participants (*Hugo Demeyere - BePCIS*)
- 10:00 - 11:30 Rheological concepts and rheological phenomena in colloids
- Motivation and goals
 - Basic concepts of rheology
 - Review of rheological phenomena in colloidal systems
- 11:30 - 13:00 Suspensions of large particles (involving only hydrodynamic forces)
- Dilute suspensions: interactions between particles and flow
 - Semi-dilute suspensions: taking into account hydrodynamic particle interactions
 - Concentrated suspensions: maximum packing, particle size distribution, empirical viscosity-concentration relations
 - Non-spherical particles
- 13:00 - 14:00 **Lunch**
- 14:00 - 15:30 Suspensions of Brownian micro/nano particles (hydrodynamic & thermal forces)
- Brownian forces and their impact on rheology
 - Shear thinning and shear thickening, scaling methods
 - Viscoelasticity in Brownian systems
 - Non-spherical Brownian particles: rheological effects
- 15:30 - 16:00 **Coffee**
- 16:00 - 17:30 Stabilized colloidal suspensions (involving repulsive inter-particle forces)
- Stabilization mechanisms in colloids, state diagrams, colloidal glasses
 - Effect of electrostatic and steric stabilization on the flow behavior (dilute, concentrated)
 - Scaling laws for the rheology of stable systems
- 18:30 - ... **Course Dinner**

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- 9:00 - 10:30 Flocculated and gelling systems (involving attractive particle interactions)
- Mechanisms for flocculation and gelling
 - Structure of flocculated systems (flocs, fractals, particle gels, percolation)
 - Rheology of attractive dispersions and gels
 - Thixotropy: time-dependent viscosities
- 10:30 - 11:00 **Coffee**
- 11:00 - 12:30 Rheological measurements on colloidal systems
- Special problems and requirements
 - Measurement strategies for colloids
 - Deducing colloidal characteristics from rheological measurements
 - Special characterization techniques
- 12:30 - 13:30 **Lunch**
- 13:30 - 15:00 Complex systems: polymer media (nanocomposites) and non spherical particles
- Special flow phenomena with particles in polymer media
 - Viscosity curves with micro/nano particles in polymer media
 - Viscoelastic characteristics of polymers filled with nano/micro particles
 - Shape effects of non-spherical particles
- 15:00 - 15:30 **Coffee**
- 15:30 - 17:00 Emulsions
- Droplet fate during flow
 - Scaling parameters for emulsion rheology
 - Rheology-structure relations in emulsions
 - Highly concentrated emulsions
- 17:00 End of course / course evaluation