COURSE DESCRIPTION

Training Event	Advanced Modules III (ESPCI Meeting 2020)
Course Presenter and Title	Laser Light Scattering – Characterization of Polymers in Solution PD Dr. Wolfgang Schärtl
No. hours (contact time)	4
No. hours (non-contact time)	/
Total number of hours	4
Course level	PhD candidates
Evaluation	/
Language	English
Pre-requisites	Powerpoint slides of the course, degree in science (master)

Course objectives

Teach the participants the potential of laser light scattering as a characterization method to study polymeric samples in very dilute solutions.

Students shall be able, after listening to the lecture, to solve basic problems of the light scattering technique by themselves (as verified by guided students exercises)

Course description

(i) Lecture: theoretical background of SLS and DLS
(ii) Lecture: selected illustrative examples from literature
(iii) Students exercises: groups of 2 students, presentation of the problems solutions by the students

COURSE DESCRIPTION

Training Event	Advanced Modules III (ESPCI Meeting 2020)
Course Presenters and Title	Jean-Luc Putaux Electron microscopy of macromolecular systems
No. hours (contact time)	3
No. hours (non-contact time)	/
Total number of hours	3
Course level	Graduate level
Evaluation	/
Language	English
Pre-requisites	

Course objectives

Electron microscopy is an important tool to characterize the morphology and structure of macromolecular systems at various lengthscales. Scanning electron microscopy (SEM) is generally used to characterize the surface topography of large / bulk samples and fractured materials, while transmission electron microscopy (TEM) allows visualizing the projected volume of small / ultrathin specimens. During this course, the specific constraints in terms of sample preparation and observation will be described for each technique.

Course description

After an introduction explaining why and how electrons can be used to characterize macromolecular systems at a nanometric scale, the important information about the specificities of both scanning and transmission electron microscopies and related equipment will be given. Using several images from specific examples, the main sample preparation methods will be detailed. The strategies to observe radiation-sensitive materials and to analyze the contrasts in the images both qualitatively and quantitatively will be presented.

COURSE DESCRIPTION

Training Event	Advanced Modules III (ESPCI Meeting 2020)
Course Presenters and Title	Rheology at the microscopic scale Michel Cloitre
No. hours (contact time)	4
No. hours (non-contact time)	/
Total number of hours	4
Course level	Graduate level
Evaluation	/
Language	English
Pre-requisites	Macroscopic rheology (undergraduate level). Basic knowledge in optics, light scattering, microfluidics, statistical physics.

Course objectives

Conventional rheology provides global information on the mechanical behavior of soft materials, leading to profound insights into microscopic phenomena. Microrheology gives direct access to the microstructure and the local dynamics. It is particularly relevant in order to probe very soft materials which are available in small amounts, perform in-vivo studies, extend the range of accessible time scales, or probe heterogeneous media. This module will provide a comprehensive panorama of the methods which are available in relation with a variety of dedicated applications.

Course description

- Introduction to passive and active microrheology
- Relation between local dynamics and rheology
- Measurement of the local dynamics: DLS, DWS, particle tracking techniques
- Rheo-scattering and rheo-imaging techniques
- Flow heterogeneities and non local rheology
- Magnetic bead and optical tweezers microrheology