

JEAN-FRANÇOIS BERRET
CNRS ET UNIVERSITÉ DENIS DIDEROT PARIS-VII

Introduction to Soft Matter: basic concepts and applications

J.-F. Berret

*Matière et Systèmes Complexes, UMR 7057 CNRS Université Denis Diderot Paris-VII,
Bâtiment Condorcet, 10 rue Alice Domon et Léonie Duquet, 75205 Paris, France.*

Soft matter is a subfield of condensed matter that studies a variety of physical systems that are deformed or structurally altered by thermal or mechanical stresses. Soft matter comprises simple liquids, colloids, polymers, foams, gels, granular materials, liquid crystals, and a number of biological materials. In this course, I will discuss soft matter basic concepts such as entropy, physical structures at the mesoscopic scale and thermal fluctuations. The course is divided in three sections. The first section explores the physics of colloids, focusing on DLVO (Derjaguin, Landau, Verwey and Overbeek) interactions and on the analogy between atoms and colloids. The second part describes the assembly properties of low molecular weight molecules such as surfactants and short polymer chain. The third part proposes an overview of some polymer properties and of their effects on the mechanical behavior of materials. Each part is illustrated with important results obtained in the last decades.