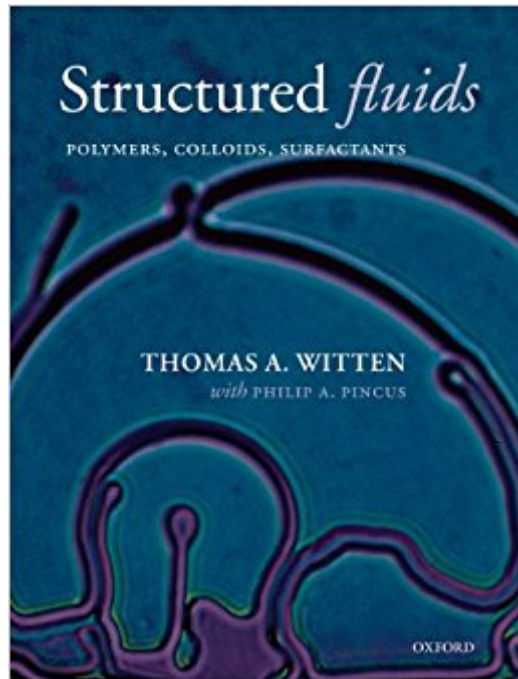




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Structured Fluids: Polymers, Colloids, Surfactants



Synopsis

Over the last thirty years, the study of liquids containing polymers, surfactants, or colloidal particles has developed from a loose assembly of facts into a coherent discipline with substantial predictive power. These liquids expand our conception of what condensed matter can do. Such structured-fluid phenomena dominate the physical environment within living cells. This book teaches how to think of these fluids from a unified point of view showing the far-reaching effects of thermal fluctuations in producing forces and motions. Keeping mathematics to a minimum, the book seeks the simplest explanations that account for the distinctive scaling properties of these fluids. An example is the growth of viscosity of a polymer solution as the cube of the molecular weight of the constituent polymers. Another is the hydrodynamic radius of a colloidal aggregate, which remains comparable to its geometrical radius even though the density of particles in the aggregate becomes arbitrarily small. The book aims for a simplicity, unity and depth not found in previous treatments, and includes numerous figures, tables and problems. It will be an ideal textbook for teaching undergraduates in physical science how to understand soft matter, but will also be of interest to industrial scientists, who want to gain a broader understanding of soft matter systems.

Book Information

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Customer Reviews

We use it for a soft matter physics class and I really love it. This book has all the essence of soft material and I understand it! I think it's a good textbook that I can say I enjoy reading it.

Structured Fluids relies more on presenting the physical picture than mathematical machinery, stresses more on intuition and scaling concepts than on derivations and obtrusive pages of equations. In doing so, it makes itself easier to grasp than say the texts by Chaikin and Lubensky or for that matter by Kleman and Lavrentovich. The formalism is done with enough depth, to benefit both beginners and experts of the field, and thus the book is better suited for graduate student course than say RAL Jones or Hamley's texts. The essential knowledge related to polymers, colloids and surfactants is in here, and the book is fairly up to date with recent advances in these areas. The references listed at the end of each chapter are most useful pointers for anyone who seeks to delve deeper into the mysteries of soft matter. In fact, reading this text reminds one of the style of de Gennes, and having been written in the same spirit by these very illustrious scientists, the book is comprehensive and erudite in content and presentation. The book starts off by talking about fundamentals, including elements of statistical physics and experimental probes used to investigate the soft matter. This sets stage for discussion of various themes related to say polymers, where random walk statistics capture essential physics required to describe a coil, scaling concepts and basic thermodynamics tells about coil dimensions in different solvents and extension of brownian dynamics explains mobility of chains. The corresponding experimental tools of light scattering and viscosity highlight how these can be measured. colloids, where the nature of interaction between colloidal particles determines their static and dynamic behavior, leading to experimentally observed self-assembly and aggregation. interfaces, where basics of surface tension come in to explain behavior of colloids and polymers near walls and interfaces. surfactants, which borrows principles from previous chapters, exhibiting rich phase behavior dictated by statistical thermodynamics, dynamics related to solvent quality and aggregation dependent on aggregation. A must read for everyone interested, active (and maybe even for experts) in the field!

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