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Physics : Biological and Medical Physics, Biophysics

Fernández, Ariel

# Physics at the Biomolecular Interface

Fundamentals for Molecular Targeted Therapy

- Focuses on the role of interfacial forces in understanding biological phenomena at the molecular scale
- Develops a statistical mechanical framework suited to study the protein-water interface
- Provides unique computational tools to tackle core problems in biophysics, such as the protein folding problem, the discovery of binding sites in proteins and the rational design of therapeutic drugs
- Equips the reader with a unique bioinformatics background to develop a technological platform for rational drug design grounded in physics fundamentals

This book focuses primarily on the role of interfacial forces in understanding biological phenomena at the molecular scale. By providing a suitable statistical mechanical apparatus to handle the biomolecular interface, the book becomes uniquely positioned to address core problems in molecular biophysics. It highlights the importance of interfacial tension in delineating a solution to the protein folding problem, in unravelling the physico-chemical basis of enzyme catalysis and protein associations, and in rationally designing molecular targeted therapies. Thus grounded in fundamental science, the book develops a powerful technological platform for drug discovery, while it is set to inspire scientists at any level in their careers determined to address the major challenges in molecular biophysics. The acknowledgment of how exquisitely the structure and dynamics of proteins and their aqueous environment are related attests to the overdue recognition that biomolecular phenomena cannot be effectively understood without dealing with interfacial behaviour. There is an urge to grasp how biologically relevant behaviour is shaped by the structuring of biomolecular interfaces and how interfacial tension affects the molecular events that take place in the cell. This book squarely addresses these needs from a physicist perspective. The book may serve as a monograph for practitioners and, alternatively, as an advanced textbook. Fruitful reading requires a background in physical chemistry and some basics in biophysics.

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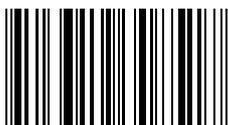
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