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| Nota di contenuto | BIOINSPIRATION AND BIOMIMICRY IN CHEMISTRY; CONTENTS; Foreword: Jean-Marie Lehn; Foreword: Janine Benyus; Preface; Contributors; 1. Introduction: The Concept of Biomimicry and Bioinspiration in Chemistry; 1.1 What is Biomimicry and Bioinspiration?; 1.2 Why Seek Inspiration from, or Replicate Biology?; 1.2.1 Biomimicry and Bioinspiration as a Means of Learning from Nature and Reverse- Engineering from Nature; 1.2.2 Biomimicry and Bioinspiration as a Test of Our Understanding of Nature; 1.2.3 Going Beyond Biomimicry and Bioinspiration 1.3 Other Monikers: Bioutilization, Bioextraction, Bioderivation, and Bionics1.4 Biomimicry and Sustainability; 1.5 Biomimicry and Nanostructure; 1.6 Bioinspiration and Structural Hierarchies; 1.7 |

Bioinspiration and Self-Assembly; 1.8 Bioinspiration and Function; 1.9 Future Perspectives: Drawing Inspiration from the Complex System that is Nature; References; 2. Bioinspired Self-Assembly I: Self-Assembled Structures; 2.1 Introduction; 2.2 Molecular Clefts, Capsules, and Cages; 2.2.1 Organic Cage Systems; 2.2.2 Metallosupramolecular Cage Systems; 2.3 Enzyme Mimics and Models: The Example of Carbonic Anhydrase; 2.4 Self-Assembled Liposome-Like Systems; 2.5 Ion Channel Mimics; 2.6 Base-Pairing Structures; 2.7 DNA-RNA Structures; 2.8 Bioinspired Frameworks; 2.9 Conclusion; References; 3. Bioinspired Self-Assembly II: Principles of Cooperativity in Bioinspired Self-Assembling Systems; 3.1 Introduction; 3.2 Statistical Factors in Self-Assembly; 3.3 Allosteric Cooperativity; 3.4 Effective Molarity; 3.5 Chelate Cooperativity; 3.6 Interannular Cooperativity; 3.7 Stability of an Assembly; 3.8 Conclusion; References; 4. Bioinspired Molecular Machines; 4.1 Introduction; 4.1.1 Inspirational Antecedents: Biology, Engineering, and Chemistry; 4.1.2 Chemical Integration; 4.1.3 Chapter Overview; 4.2 Mechanical Effects in Biological Machines; 4.2.1 Skeletal Muscle's Structure and Function; 4.2.2 Kinesin; 4.2.3 F1-ATP Synthase; 4.2.4 Common Features of Biological Machines; 4.2.5 Variation in Biomotors; 4.2.6 Descriptions and Analogies of Molecular Machines; 4.3 Theoretical Considerations: Flashing Ratchets; 4.4 Sliding Machines; 4.4.1 Linear Machines: Rotaxanes; 4.4.2 Mechanistic Insights: Ex Situ and In Situ (Maxwell's Demon); 4.4.3 Bioinspiration in Rotaxanes; 4.4.4 Molecular Muscles as Length Changes; 4.5 Rotary Motors; 4.5.1 Interlocked Rotary Machines: Catenanes; 4.5.2 Unimolecular Rotating Machines; 4.6 Moving Larger Scale Objects; 4.7 Walking Machines; 4.8 Ingenious Machines; 4.8.1 Molecular Machines Inspired by Macroscopic Ones: Scissors and Elevators; 4.8.2 Artificial Motility at the Nanoscale; 4.8.3 Moving Molecules Across Surfaces; 4.9 Using Synthetic Bioinspired Machines in Biology; 4.10 Perspective; 4.10.1 Lessons and Departures from Biological Molecular Machines

Sommario/riassunto

Can we emulate nature's technology in chemistry? Through billions of years of evolution, Nature has generated some remarkable systems and substances that have made life on earth what it is today. Increasingly, scientists are seeking to mimic Nature's systems and processes in the lab in order to harness the power of Nature for the benefit of society. Bioinspiration and Biomimicry in Chemistry explores the chemistry of Nature and how we can replicate what Nature does in abiological settings. Specifically, the book focuses on wholly artificial, man-made systems that e
