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in Photosystem II of Plants Green Algae and Cyanobacteria; 1. INTRODUCTION; 2. COMPOSITION STRUCTURE AND FUNCTION OF LIGHT HARVESTING COMPLEXES; 3. EXCITATION PRESSURE AND PHOTOSTASIS 4. ROLE OF LIGHT HARVESTING IN PHOTOPROTECTION AND PHOTOSTASIS 5. NUTRIENT LIMITATIONS; 6. SENSING CELLULAR ENERGY IMBALANCE AND REGULATION OF LIGHT HARVESTING; ACKNOWLEDGEMENTS; From Biological to Synthetic Light-Harvesting Materials - The Elementary Steps; 1. INTRODUCTION; 2. PHOTOSYNTHETIC LIGHT-HARVESTING - ENERGY TRANSFER AND TRAPPING; 3. ORGANIC CONDUCTING POLYMERS: LIGHT HARVESTING AND GENERATION; 4. DYE-SENSITIZED NANOSTRUCTURED SEMI-CONDUCTORS - ENERGY CONVERSION BY ULTRAFAST ELECTRON TRANSFER; 5. TRANSITION METAL SUPRAMOLECULAR COMPLEXES - ENERGY TRANSFER IN ARTIFICIAL ANTENNAS ACKNOWLEDGEMENTS Controlling Excitation Energy and Electron Transfer by Tuning the Electronic Coupling; 1. INTRODUCTION; 2. THEORETICAL BACKGROUND; 3. DONOR-BRIDGE-ACCEPTOR SYSTEMS WITH  $\pi$ -BRIDGES; 4.  $\sigma$ -BRIDGES AND SUPEREXCHANGE - THE THROUGH-BOND COUPLING MECHANISM.; 5. CONCLUSIONS; Energy Transfer and Trapping in Engineered Macromolecules; 1. INTRODUCTION; 2. EXPERIMENTAL DETAILS; 3. ENGINEERED POLYMER SYSTEMS; 4. CONCLUSIONS; ACKNOWLEDGMENTS; Dendrimer-Based Devices: Antennae and Amplifiers; 1. INTRODUCTION; 2. DENDRIMERS AS LIGHT HARVESTING ANTENNAE; 3. DENDRIMERIC AMPLIFIERS Energy Harvesting in Synthetic Dendritic Materials 1. INTRODUCTION; 2. METAL-CONTAINING DENDRIMERS; 3. PHENYLACETYLENE DENDRIMERS; 4. DENDRIMERS CONTAINING DISTYRYLBENZENE OR STILBENE UNITS; 5. PORPHYRIN-CONTAINING DENDRIMERS; 6. COUMARIN DYE LABELED POLY(ARYLEETHER) DENDRIMERS; 7. TWO-PHOTON LIGHT HARVESTING AND ENERGY TRANSFER; 8. POLYPHENYLENE DENDRIMERS; 9. ENERGY TRANSFER TO ENCAPSULATED GUESTS; 10. CONCLUSION; ACKNOWLEDGEMENTS; Fullerenes in Biomimetic Donor-Acceptor Networks; 1. INTRODUCTION; 2. HYDROGEN BONDING MOTIFS; 3.  $\pi$ -STACK MOTIFS; 4. CROWN ETHER COMPLEXATION MOTIFS 5. METAL MEDIATED MOTIFS

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### Sommario/riassunto

The science of energy harvesting materials is experiencing phenomenal growth and attracting huge interest. Exploiting recently acquired insights into the fundamental mechanisms and principles of photosynthesis, it is now possible to forge entirely new and distinctive molecular materials and devise artificial photosystems and applications far remote from conventional solar cell technology. In this comprehensive treatment of energy harvesting, a team of internationally acclaimed scientists at the forefront of the subject paint a state-of-the-art picture of modern energy harvesting materials science

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