

1. Record Nr.	UNINA9911006616903321
Titolo	Nanostructured and photoelectrochemical systems for solar photon conversion // editors, Mary D. Archer, Arthur J. Nozik
Pubbl/distr/stampa	London, : Imperial College Press Singapore ; ; Hackensack, NJ, : World Scientific Pub. Co., c2008
ISBN	9781601197733 160119773X 9781848161542 1848161549
Descrizione fisica	1 online resource (780 p.)
Collana	Series on photoconversion of solar energy ; ; v. 3
Altri autori (Persone)	ArcherMary D NozikArthur J. <1936->
Disciplina	621.47
Soggetti	Photoelectrochemistry Nanostructured materials Solar energy Photocatalysis
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	CONTENTS; About the authors; Preface; Overview M. D. Archer; 1.1 Themes; 1.2 Historical perspective; 1.3 Extremely thin absorber (ETA) cells; 1.4 Organic solar cells; 1.5 Dye-sensitised solar cells (Gratzel cells); 1.6 Regenerative solar cells; 1.7 Future prospects; App. The vacuum scale of electrode potential and the concept of the 1A solution Fermi level; 1A.1 SHE and SCE scales of electrode potential; 1A.2 Absolute electrode potentials; 1A.3 Absolute electrode potential of the SHE; 1A.4 The solution Fermi level; 1A.5 Vacuum scale of electrode potential; References 2 Fundamentals in photoelectrochemistry R. J. D. Miller and R. Memming2.1 Introduction; 2.2 Photophysics of semiconductors and semiconductor particles; 2.2.1 Field effects; 2.3 Carrier relaxation; 2.3.1 Bulk three-dimensional semiconductors; 2.3.2 Layered semiconductors: quasi-two-dimensional systems; 2.3.3 Quasi-one-dimensional semiconductors; 2.3.4 Nanoscale-structured

semiconductors; 2.3.5 Midgap state effects: surface-state trapping; 2.4 Charge transfer at the semiconductor-electrolyte interface; 2.4.1 Energy levels at the semiconductor-liquid interface; 2.4.2 Majority-carrier processes
2.4.3 Minority-carrier processes
2.4.4 The quasi-Fermi level concept for electron-transfer processes; 2.4.5 Interfacial charge-transfer dynamics; 2.4.6 Dye sensitisation; 2.5 Conversion of solar energy; 2.5.1 Electrochemical photovoltaic cells; 2.5.2 Photoelectrolysis of water; 2.5.3 Conversion efficiencies; 2.5.4 Competition between redox reactions and anodic decomposition; 2.6 Photocatalysis; 2.7 Summary; Editorial note; References; 3 Fundamentals and applications of quantum-confined structures A. J. Nozik; 3.1 Introduction; 3.2 Quantisation effects in semiconductor nanostructures
3.2.1 Synthesis of semiconductor nanostructures
3.2.2 Energy levels in quantum wells, superlattices and quantum dots; 3.3 Optical spectroscopy of quantum wells, superlattices and quantum dots; 3.3.1 Quantum wells and superlattices; 3.3.2 Quantum dots; 3.4 Hot electron and hole cooling dynamics in quantum-confined semiconductors; 3.4.1 Quantum wells and superlattices; 3.4.2 Quantum dots; 3.5 High conversion efficiency via multiple exciton generation in quantum dots; 3.5.1 Cooling dynamics in quantum dots; 3.5.2 Electron-hole pair (exciton) multiplication in quantum dots
3.5.3 Theory of multiple exciton generation
3.5.4 Thermodynamic calculations of conversion efficiency in MEG QD solar cells; 3.6 Quantum dot solar cell configurations; 3.6.1 Photoelectrodes composed of quantum dot arrays; 3.6.2 Quantum dot-sensitised nanocrystalline TiO₂ solar cells; 3.6.3 Quantum dots dispersed in organic semiconductor polymer matrices; 3.7 Summary and conclusions; Acknowledgements; References; 4 Fundamentals and applications in electron-transfer reactions M. D. Archer; 4.1 Introduction; 4.2 Historical perspective; 4.3 Thermodynamics of ET and PET reactions
4.4 Classical Marcus theory

Sommario/riassunto

In this book, expert authors describe advanced solar photon conversion approaches that promise highly efficient photovoltaic and photoelectrochemical cells with sophisticated architectures on the one hand, and plastic photovoltaic coatings that are inexpensive enough to be disposable on the other. Their leitmotifs include light-induced exciton generation, junction architectures that lead to efficient exciton dissociation, and charge collection by percolation through mesoscale phases. Photocatalysis is closely related to photoelectrochemistry, and the fundamentals of both disciplines are covered.
