

1. Record Nr.	UNINA9910895965303321
Titolo	OASDI beneficiaries by state and county / / U.S. Department of Health and Human Services, Social Security Administration, Office of Research and Statistics
Pubbl/distr/stampa	[Washington, D.C.], : U.S. Dept. of Health and Human Services, Social Security Administration, Office of Research and Statistics, 1987-
Descrizione fisica	1 online resource
Collana	SSA publication ; ; no. 13-11954
Disciplina	368.4/3/00973021
Soggetti	Social security beneficiaries - United States - States Social security beneficiaries - United States Social Security Insurance Benefits Social security beneficiaries Social security beneficiaries - U.S. states Statistics. Tables. Periodicals. United States
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Periodico

2. Record Nr.	UNINA9911020260303321
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Titolo	Introduction to biophotonics // Paras N. Prasad
Pubbl/distr/stampa	Hoboken, NJ, : Wiley-Interscience, c2003
ISBN	9786610367702 9781280367700 1280367709 9780470242568 0470242566 9780471465393 0471465399 9780471465386 0471465380
Descrizione fisica	1 online resource (622 p.)
Disciplina	571.4/55
Soggetti	Photobiology Photonics Biosensors Nanotechnology
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	INTRODUCTION TO BIOPHOTONICS; SUMMARY OF CONTENTS; CONTENTS; Preface; Acknowledgments; 1. Introduction; 1.1 Biophotonics-A New Frontier; 1.2 An Invitation to Multidisciplinary Education, Training, and Research; 1.3 Opportunities for Both Basic Research and Biotechnology Development; 1.4 Scope of this Book; 2. Fundamentals of Light and Matter; 2.1 Nature of Light; 2.1.1 Dual Character of Light; 2.1.2 Propagation of Light as Waves; 2.1.3 Coherence of Light; 2.1.4 Light as Photon Particles; 2.1.5 Optical Activity and Birefringence; 2.1.6 Different Light Sources; 2.2 Quantized States of Matter 2.2.1 Introductory Concepts2.2.2 Quantized States of Atoms; 2.2.3 Quantized States of Molecules: Partitioning of Molecular Energies; 2.2.4

Electronic States of a Molecule; 2.2.5 Bonding in Organic Molecules; 2.2.6 Conjugated Organic Molecules; 2.2.7 Vibrational States of a Molecule; 2.3 Intermolecular Effects; 2.4 Three-Dimensional Structures and Stereoisomers; Highlights of the Chapter; References; 3. Basics of Biology; 3.1 Introductory Concepts; 3.2 Cellular Structure; 3.3 Various Types of Cells; 3.4 Chemical Building Blocks 3.5 Interactions Determining Three-Dimensional Structures of Biopolymers 3.6 Other Important Cellular Components; 3.7 Cellular Processes; 3.8 Protein Classification and Function; 3.9 Organization of Cells into Tissues; 3.10 Types of Tissues and Their Functions; 3.11 Tumors and Cancers; Highlights of the Chapter; References; 4. Fundamentals of Light-Matter Interactions; 4.1 Interactions Between Light and a Molecule; 4.1.1. Nature of Interactions; 4.1.2. Einstein's Model of Absorption and Emission; 4.2 Interaction of Light with a Bulk Matter; 4.3 Fate of Excited State 4.4 Various Types of Spectroscopy 4.5 Electronic Absorption Spectroscopy; 4.6 Electronic Luminescence Spectroscopy; 4.7 Vibrational Spectroscopy; 4.8 Spectroscopy Utilizing Optical Activity of Chiral Media; 4.9 Fluorescence Correlation Spectroscopy (FCS); Highlights of the Chapter; References; 5. Principles of Lasers, Current Laser Technology, and Nonlinear Optics; 5.1 Principles of Lasers; 5.1.1 Lasers: A New Light Source; 5.1.2 Principles of Laser Action; 5.1.3 Classification of Lasers; 5.1.4 Some Important Lasers for Biophotonics; 5.2 Current Laser Technologies 5.3 Quantitative Description of Light: Radiometry 5.4 Nonlinear Optical Processes with Intense Laser Beam; 5.4.1 Mechanism of Nonlinear Optical Processes; 5.4.2 Frequency Conversion by a Second-Order Nonlinear Optical Process; 5.4.3 Symmetry Requirement for a Second-Order Process; 5.4.4 Frequency Conversion by a Third-Order Nonlinear Optical Process; 5.4.5 Multiphoton Absorption; 5.5 Time-Resolved Studies; 5.6 Laser Safety; Highlights of the Chapter; References; 6. Photobiology; 6.1 Photobiology-At the Core of Biophotonics; 6.2 Interaction of Light with Cells; 6.2.1 Light Absorption in Cells 6.2.2 Light-Induced Cellular Processes

Sommario/riassunto

Paras Prasad's text provides a basic knowledge of a broad range of topics so that individuals in all disciplines can rapidly acquire the minimal necessary background for research and development in biophotonics. Introduction to Biophotonics serves as both a textbook for education and training as well as a reference book that aids research and development of those areas integrating light, photonics, and biological systems. Each chapter contains a topic introduction, a review of key data, and description of future directions for technical innovation. Introduction to Biophotonics covers the basic
