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Methods in Computational Biology Ross Carlson 2019-07-03 Modern biology is rapidly becoming a study of large sets of data. Understanding these data sets is a major challenge for most life sciences, including the medical, environmental, and bioprocess fields. Computational biology approaches are essential for leveraging this ongoing revolution in omics data. A primary goal of this Special Issue, entitled “Methods in Computational Biology”, is the communication of computational biology methods, which can extract biological design principles from complex data sets, described in enough detail to permit the reproduction of the results. This issue integrates interdisciplinary researchers such as biologists, computer scientists, engineers, and mathematicians to advance biological systems analysis. The Special Issue contains the following sections: • Reviews of Computational Methods • Computational Analysis of Biological Dynamics: From Molecular to Cellular to Tissue/Consortia Levels • The Interface of Biotic and Abiotic Processes • Processing of Large Data Sets for Enhanced Analysis • Parameter Optimization and Measurement

Industrial Scale Suspension Culture of Living Cells Hans-Peter Meyer 2014-08-04 The submersed cultivation of organisms in sterile containments or fermenters has become the standard manufacturing procedure, and will remain the gold standard for some time to come. This book thus addresses submersed cell culture and fermentation and its importance for the manufacturing industry. It goes beyond expression systems and integrally investigates all those factors relevant for manufacturing using suspension cultures. In so doing, the contributions cover all industrial cultivation methods in a comprehensive and comparative manner, with most of the authors coming from the industry itself. Depending on the maturity of the technology, the chapters address in turn the expression system, basic process design, key factors affecting process economics, plant and bioreactor design, and regulatory aspects.

Recent Progress of Biochemical and Biomedical Engineering in Japan II Takeshi Kobayashi 2004-07-21 The areas we deal with in biochemical engineering have expanded to include many various organisms and humans. This book has gathered together the information of these expanded areas in biochemical engineering in Japan. These two volumes are composed of 15 chapters on microbial cultivation techniques, metabolic engineering, recombinant protein production by transgenic avian cells to biomedical engineering including tissue engineering and cancer therapy. Hopefully, these volumes will give readers a glimpse of the past and also a view of what may happen in biochemical engineering in Japan.

Nanotechnology for Chemical Engineers Said Salaheldeen Elnashaie 2015-07-03 The book describes the basic principles of transforming nano-technology into nano-engineering with a particular focus on chemical engineering fundamentals. This book provides vital information about differences between descriptive technology and quantitative engineering for students as well as working professionals in various fields of nanotechnology. Besides chemical engineering principles, the fundamentals of nanotechnology are also covered along with detailed

explanation of several specific nanoscale processes from chemical engineering point of view. This information is presented in form of practical examples and case studies that help the engineers and researchers to integrate the processes which can meet the commercial production. It is worth mentioning here that, the main challenge in nanostructure and nanodevices production is nowadays related to the economic point of view. The uniqueness of this book is a balance between important insights into the synthetic methods of nano-structures and nanomaterials and their applications with chemical engineering rules that educates the readers about nanoscale process design, simulation, modelling and optimization. Briefly, the book takes the readers through a journey from fundamentals to frontiers of engineering of nanoscale processes and informs them about industrial perspective research challenges, opportunities and synergism in chemical Engineering and nanotechnology. Utilising this information the readers can make informed decisions on their career and business.

Current Developments in Biotechnology and Bioengineering Ashok Pandey 2016-09-17 Current Developments in Biotechnology and Bioengineering: Production, Isolation and Purification of Industrial Products provides extensive coverage of new developments, state-of-the-art technologies, and potential future trends, focusing on industrial biotechnology and bioengineering practices for the production of industrial products, such as enzymes, organic acids, biopolymers, and biosurfactants, and the processes for isolating and purifying them from a production medium. During the last few years, the tools of molecular biology and genetic and metabolic engineering have rendered tremendous improvements in the production of industrial products by fermentation. Structured by industrial product classifications, this book provides an overview of the current practice, status, and future potential for the production of these agents, along with reviews of the industrial scenario relating to their production. Provides information on industrial bioprocesses for the production of microbial products by fermentation Includes separation and purification processes of fermentation products Presents economic and feasibility assessments of the various processes and their scaling up Links biotechnology and bioengineering for industrial process development

Renewable Energy and Sustainable Technologies for Building and Environmental Applications Mardiana Idayu Ahmad 2016-04-20 This diverse resource on renewable energy and sustainable technologies highlights the status, state of the art, challenges, advancements and options in areas such as energy recovery systems, turbine ventilators, green composites, biofuels and bio-resources for energy production, wind energy, integrated energy-efficient systems, thermal energy storage, natural ventilation & day-lighting systems, and low carbon technologies for building and environmental applications. It is designed to serve as a reference book for students, researchers, manufacturers and professionals working in these fields. The editors have gathered articles from world-leading experts that clearly illustrate key areas in renewable energy and sustainability. The distinct role of these technologies in future endeavors is stressed by taking into account the opportunities to contribute with new approaches, methods and directions for building and environmental applications. The in-depth discussion presented in this book will give readers a clear understanding of every important aspect of each technology’s applications,

optimum configuration, modifications, limitations and their possible improvements.

Bioreactors: Process and Analysis Tapobrata Panda 2011 6. Bioreactor modeling -- Model - what is it? -- Definition of lumped and distributed parameter models -- Introduction to a few terminologies and theorems -- Modeling principles -- Steps in modeling -- Fundamental laws used in process modeling -- First-order systems -- Second-order systems -- Complexity of the model -- Parameter sensitivity -- Exercises -- References -- Appendix 6 -- 7. Transport processes in bioreactors -- Introduction -- Heat transfer -- Other parameters influencing transfer operations -- Exercises -- References -- 8. Controls in bioreactors -- Introduction -- Control tasks in a bioreactor system -- Instrumentation to control a bioreactor -- Controlled variables and measurement devices -- Procedure for design of efficient control systems -- Conventional control techniques -- Advanced control techniques -- Consistency checks on measurements -- Adaptive online optimizing control of bioreactor system -- Exercises -- References -- Appendix 8 -- 9. Case studies -- Introduction -- Design of packed bed bioreactor -- Airlift bioreactors -- Hollow fiber bioreactor (HFBR) -- Plant cell bioreactor -- Design of bioreactors for solid state fermentation (SSF) -- Mammalian cell bioreactor design -- Exercises -- References -- Appendix 9 -- 10. Application of computational fluid dynamics in bioreactor analysis and design -- Introduction -- Fluid dynamic modeling -- Simulation -- Exercises -- References -- Appendix 10 -- 11. Scale-up of bioreactors -- Introduction -- Additional scale-up problems in bioreactors -- Criteria of scale-up -- Similarity criteria -- Scale-up methods -- Generalized approaches to scale-up in combination of methods -- Examples -- Exercises -- References -- 12. Mechanical aspects of bioreactor design -- Introduction -- Requirements for construction of a bioreactor -- Guidelines for bioreactor design -- Bioreactor vessels -- Agitator assembly -- Exercises -- References -- Appendix 12

PID Control in the Third Millennium Ramon Vilanova 2012-02-03 The early 21st century has seen a renewed interest in research in the widely-adopted proportional-integral-differential (PID) form of control. PID Control in the Third Millennium provides an overview of the advances made as a result. Featuring: new approaches for controller tuning; control structures and configurations for more efficient control; practical issues in PID implementation; and non-standard approaches to PID including fractional-order, event-based, nonlinear, data-driven and predictive control; the nearly twenty chapters provide a state-of-the-art resumé of PID controller theory, design and realization. Each chapter has specialist authorship and ideas clearly characterized from both academic and industrial viewpoints. PID Control in the Third Millennium is of interest to academics requiring a reference for the current state of PID-related research and a stimulus for further inquiry. Industrial practitioners and manufacturers of control systems with application problems relating to PID will find this to be a practical source of appropriate and advanced solutions.

Cosmetic Formulation Heather A.E. Benson 2019-04-05 Cosmetics are the most widely applied products to the skin and include creams, lotions, gels and sprays. Their formulation, design and manufacturing ranges from large cosmetic houses to small private companies. This book covers the current science in the formulations of cosmetics applied to the skin. It includes basic formulation, skin science, advanced formulation, and cosmetic product development, including both descriptive and mechanistic content with an emphasis on practical aspects. Key Features: Covers cosmetic products/formulation from theory to practice Includes case studies to illustrate real-life formulation development and problem solving Offers a practical, user-friendly approach, relying on the work of recognized experts in the field Provides insights into the future directions in cosmetic product development Presents basic formulation, skin science, advanced formulation and cosmetic product development

Bacterial Biofilms Tony Romeo 2008-02-26 Throughout the biological world, bacteria thrive predominantly in surface-attached, matrix-enclosed, multicellular communities or biofilms, as opposed to isolated planktonic cells. This choice of lifestyle is not trivial, as it involves major shifts in the use of genetic information and cellular energy, and has profound consequences for bacterial physiology and survival. Growth within a biofilm can thwart immune

function and antibiotic therapy and thereby complicate the treatment of infectious diseases, especially chronic and foreign device-associated infections. Modern studies of many important biofilms have advanced well beyond the descriptive stage, and have begun to provide molecular details of the structural, biochemical, and genetic processes that drive biofilm formation and its dispersion. There is much diversity in the details of biofilm development among various species, but there are also commonalities. In most species, environmental and nutritional conditions greatly influence biofilm development. Similar kinds of adhesive molecules often promote biofilm formation in diverse species. Signaling and regulatory processes that drive biofilm development are often conserved, especially among related bacteria. Knowledge of such processes holds great promise for efforts to control biofilm growth and combat biofilm-associated infections. This volume focuses on the biology of biofilms that affect human disease, although it is by no means comprehensive. It opens with chapters that provide the reader with current perspectives on biofilm development, physiology, environmental, and regulatory effects, the role of quorum sensing, and resistance/phenotypic persistence to antimicrobial agents during biofilm growth.

Advances in Chitin/Chitosan Characterization and Applications Marguerite Rinaudo 2019-04-23 Functional advanced biopolymers have received far less attention than renewable biomass (cellulose, rubber, etc.) used for energy production. Among the most advanced biopolymers known is chitosan. The term chitosan refers to a family of polysaccharides obtained by partial de-N-acetylation from chitin, one of the most abundant renewable resources in the biosphere. Chitosan has been firmly established as having unique material properties as well as biological activities. Either in its native form or as a chemical derivative, chitosan is amenable to being processed—typically under mild conditions—into soft materials such as hydrogels, colloidal nanoparticles, or nanofibers. Given its multiple biological properties, including biodegradability, antimicrobial effects, gene transfectability, and metal adsorption—to name but a few—chitosan is regarded as a widely versatile building block in various sectors (e.g., agriculture, food, cosmetics, pharmacy) and for various applications (medical devices, metal adsorption, catalysis, etc.). This Special Issue presents an updated account addressing some of the major applications, including also chemical and enzymatic modifications of oligos and polymers. A better understanding of the properties that underpin the use of chitin and chitosan in different fields is key for boosting their more extensive industrial utilization, as well as to aid regulatory agencies in establishing specifications, guidelines, and standards for the different types of products and applications.

Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition) Mohamed Ksibi 2021-04-09 This book includes over three hundred and seventy-five short papers presented during the second EMCEI, which was held in Sousse, Tunisia in October 2019. After the success of the first EMCEI in 2017, the second installment tackled emerging environmental issues together with new challenges, e.g. by focusing on innovative approaches that contribute to achieving a sustainable environment in the Mediterranean and surrounding regions and by highlighting to decision makers from related sectors the environmental considerations that should be integrated into their respective activities. Presenting a wide range of environmental topics and new findings relevant to a variety of problems in these regions, this volume will appeal to anyone working in the subject area and particularly to students interested in learning more about new advances in environmental research initiatives in view of the worsening environmental degradation of the Mediterranean and surrounding regions, which has made environmental and resource protection into an increasingly important issue hampering sustainable development and social welfare.

Process Intensification David Reay 2013-06-05 Process Intensification: Engineering for Efficiency, Sustainability and Flexibility is the first book to provide a practical working guide to understanding process intensification (PI) and developing successful PI solutions and applications in chemical process, civil, environmental, energy, pharmaceutical, biological, and biochemical systems. Process intensification is a chemical and process design

approach that leads to substantially smaller, cleaner, safer, and more energy efficient process technology. It improves process flexibility, product quality, speed to market and inherent safety, with a reduced environmental footprint. This book represents a valuable resource for engineers working with leading-edge process technologies, and those involved research and development of chemical, process, environmental, pharmaceutical, and bioscience systems. No other reference covers both the technology and application of PI, addressing fundamentals, industry applications, and including a development and implementation guide Covers hot and high growth topics, including emission prevention, sustainable design, and pinch analysis World-class authors: Colin Ramshaw pioneered PI at ICI and is widely credited as the father of the technology

Advances in Control Instrumentation Systems V. I. George 2020-07-10 This book comprises select peer-reviewed proceedings of the Control Instrumentation System Conference (CISCON 2019) in the specialized area of cyber-physical systems. The topics include current trends in the areas of instrumentation, sensors and systems, industrial automation and control, image and signal processing, robotics, renewable energy, power systems and power drives, and artificial intelligence technologies. Wide-ranging applications in various fields such as aerospace, biomedical, optical imaging and biomechanics are covered in the book. The contents of this book are useful for students, researchers as well as industry professionals working in the field of instrumentation and control engineering.

Handbook on Drugs from Natural Sources H. Panda 2010-10-01 Natural products have played an important role throughout the world in treating and preventing human diseases. Natural product medicines have come from various materials including terrestrial plants, terrestrial microorganisms, organisms etc. Historical experiences with plants as therapeutic tools have helped to introduce single chemical entities in modern medicine. About 40% of the drugs used are derived from natural sources. Most are pure substances which are isolated from various organisms & used directly or after chemical modification. Natural products will continue to be important in three areas of drug discovery: as targets for production by biotechnology as a source of new lead compounds of novel chemical structure and as the active ingredients of useful treatments derived from traditional systems. Biotechnology will contribute more new natural products for medicinal use. Plants provide a fertile source of natural products many of which are clinically important medicinal agents. Natural products have traditionally provided most of the drugs in use. Despite the achievements of synthetic chemistry and the advances towards rational drug design, natural products continue to be essential in providing medicinal compounds and as starting points for the development of synthetic analogues. With the increasing power of screening programs and the increasing interest in the reservoir of untested natural products, many future drug developments will be based, at least in part, on natural products. The major contents of the book are plant products produced in cell culture, application of genetic engineering to the production of pharmaceuticals, anti-transpirants and plant growth regulators based on, the potential and the problems of marine natural products, marine sterols, plants as a source of anti-inflammatory substances, anti-hepatotoxic principles in oriental medicinal plants, immune stimulants of fungi and higher plants, amanita muscaria in medicinal chemistry, ergot alkaloids and their derivatives in medicinal chemistry and therapy, development of drugs from cannabinoids, etc. This book contains development of new drugs from plants, work on some Thai medicinal plants, plant growth based on Jasmonates, marine sterols, bleomycin and its derivatives, drugs from cannabinoids, bioactive compounds from nature, fungi and higher plants, biological active compounds from British Marine, microbial phytotoxins as herbicides and many more. This book will be very helpful to its readers, upcoming entrepreneurs, scientists, existing industries, technical institutions, druggist etc.

Advances in Polyhydroxyalkanoate (PHA) Production Martin Koller 2018-03-23 This book is a printed edition of the Special Issue "Advances in Polyhydroxyalkanoate (PHA) Production" that was published in *Bioengineering*
Tracer Technology Octave Levenspiel 2011-11-18 The tracer method was first introduced to measure the actual flow of fluid in a vessel, and then to develop a suitable model to represent this flow. Such models are used to follow

the flow of fluid in chemical reactors and other process units, in rivers and streams, and through soils and porous structures. Also, in medicine they are used to study the flow of chemicals, harmful or not, in the blood streams of animals and man. *Tracer Technology*, written by Octave Levenspiel, shows how we use tracers to follow the flow of fluids and then we develop a variety of models to represent these flows. This activity is called tracer technology. [CJChE 2003-10](#)

Introduction to Chemical Engineering Kinetics and Reactor Design Charles G. Hill 2014-04-24 The Second Edition features new problems that engage readers in contemporary reactor design Highly praised by instructors, students, and chemical engineers, *Introduction to Chemical Engineering Kinetics & Reactor Design* has been extensively revised and updated in this Second Edition. The text continues to offer a solid background in chemical reaction kinetics as well as in material and energy balances, preparing readers with the foundation necessary for success in the design of chemical reactors. Moreover, it reflects not only the basic engineering science, but also the mathematical tools used by today's engineers to solve problems associated with the design of chemical reactors. *Introduction to Chemical Engineering Kinetics & Reactor Design* enables readers to progressively build their knowledge and skills by applying the laws of conservation of mass and energy to increasingly more difficult challenges in reactor design. The first one-third of the text emphasizes general principles of chemical reaction kinetics, setting the stage for the subsequent treatment of reactors intended to carry out homogeneous reactions, heterogeneous catalytic reactions, and biochemical transformations. Topics include: Thermodynamics of chemical reactions Determination of reaction rate expressions Elements of heterogeneous catalysis Basic concepts in reactor design and ideal reactor models Temperature and energy effects in chemical reactors Basic and applied aspects of biochemical transformations and bioreactors About 70% of the problems in this Second Edition are new. These problems, frequently based on articles culled from the research literature, help readers develop a solid understanding of the material. Many of these new problems also offer readers opportunities to use current software applications such as Mathcad and MATLAB®. By enabling readers to progressively build and apply their knowledge, the Second Edition of *Introduction to Chemical Engineering Kinetics & Reactor Design* remains a premier text for students in chemical engineering and a valuable resource for practicing engineers.

Process Technology André B. de Haan 2022-03-07 The book provides a general overview about process technology. It focuses on the structure and development of production processes, main technological operations and some important aspects of process economics. For the technological operations the authors emphasize operating principles, reasons for application and available industrial equipment.

Biosorption of Heavy Metals Bohumil Volesky 1990-08-15 This state-of-the-art volume represents the first comprehensively written book which focuses on the new field of biosorption. This fascinating work conveys essential fundamental information and outlines the perspectives of biosorption. It summarizes the metal-sorbing properties of nonliving bacterial, fungal, and algal biomass, plus highlights relevant metal-binding mechanisms. This volume also discusses the aspects of obtaining and processing microbial biomass and metal-chelating chemicals into industrially applicable biosorbent products. Microbiologists, chemists, and engineers with an interest in new technological and scientific horizons will find this reference indispensable.

Sensors Handbook Sabrie Soloman 2009-08-05 Complete, State-of-the-Art Coverage of Sensor Technologies and Applications Fully revised with the latest breakthroughs in integrated sensors and control systems, *Sensors Handbook*, Second Edition provides all of the information needed to select the optimum sensor for any type of application, including engineering, semiconductor manufacturing, medical, military, agricultural, geographical, and environmental implementations. This definitive volume discusses a wide array of sensors, including MEMS, nano, microfabricated, CMOS, smart, NIR, SpectRx(tm), remote-sensing, fiber-optic, light, ceramic, and silicon sensors. Several in-depth application examples from a variety of industries are included. The comprehensive details in this

authoritative resource enable you to accurately verify the specifications for any required component. This is the most through, up-to-date reference on sensing technologies available.

Genomic Designing for Biotic Stress Resistant Cereal Crops Chittaranjan Kole 2021-08-31 This book presents deliberations on molecular and genomic mechanisms underlying the interactions of crop plants to the biotic stresses caused by different diseases and pests that are important to develop resistant crop varieties. Knowledge on the advanced genetic and genomic crop improvement strategies including molecular breeding, transgenics, genomic-assisted breeding, and the recently emerging genome editing for developing resistant varieties in cereal crops is imperative for addressing FHNEE (food, health, nutrition, energy, and environment) security. Whole genome sequencing of these crops followed by genotyping-by-sequencing has provided precise information regarding the genes conferring resistance useful for gene discovery, allele mining, and shuttle breeding which in turn opened up the scope for 'designing' crop genomes with resistance to biotic stresses. The eight chapters each dedicated to a cereal crop in this volume elucidate on different types of biotic stresses and their effects on and interaction with the crop; enumerate on the available genetic diversity with regard to biotic stress resistance among available cultivars; illuminate on the potential gene pools for utilization in interspecific gene transfer; present brief on classical genetics of stress resistance and traditional breeding for transferring them to their cultivated counterparts; depict the success stories of genetic engineering for developing biotic stress-resistant crop varieties; discuss on molecular mapping of genes and QTLs underlying stress resistance and their marker-assisted introgression into elite varieties; enunciate on different genomics-aided techniques including genomic selection, allele mining, gene discovery, and gene pyramiding for developing adaptive crop varieties with higher quantity and quality of yields, and also elaborate some case studies on genome editing focusing on specific genes for generating biotic stress-resistant crops.

Development of Sustainable Bioprocesses Elmar Heinzle 2007-01-11 Bioprocess technology involves the combination of living matter (whole organism or enzymes) with nutrients under laboratory conditions to make a desired product within the pharmaceutical, food, cosmetics, biotechnology, fine chemicals and bulk chemicals sectors. Industry is under increasing pressure to develop new processes that are both environmentally friendly and cost-effective, and this can be achieved by taking a fresh look at process development; - namely by combining modern process modeling techniques with sustainability assessment methods. **Development of Sustainable Bioprocesses: Modeling and Assessment** describes methodologies and supporting case studies for the evolution and implementation of sustainable bioprocesses. Practical and industry-focused, the book begins with an introduction to the bioprocess industries and development procedures. Bioprocesses and bioproducts are then introduced, together with a description of the unit operations involved. Modeling procedures, a key feature of the book, are covered in chapter 3 prior to an overview of the key sustainability assessment methods in use (environmental, economic and societal). The second part of the book is devoted to case studies, which cover the development of bioprocesses in the pharmaceutical, food, fine chemicals, cosmetics and bulk chemicals industries. Some selected case studies include: citric acid, biopolymers, antibiotics, biopharmaceuticals. Supplementary material provides hands-on materials so that the techniques can be put into practice. These materials include a demo version of SuperPro Designer software (used in process engineering) and models of all featured case studies, excel sheets of assessment methods, Monte Carlo simulations and exercises. Previously available on CD-ROM, the supplementary material can now be accessed via <http://booksupport.wiley.com> by entering the author name, book title or isbn and clicking on the desired entry. This will then give a listing of all the content available for download. Please read any text files before downloading material.

Statistical Optimization of Biological Systems Tapobrata Panda 2015-11-18 A number of books written by statisticians address the mathematical optimization of biological systems, but do not directly address statistical optimization.

Statistical Optimization of Biological Systems covers the optimization of bioprocess systems in its entirety, devoting much-needed attention to the experimental optimization of biological systems using statistical techniques. Employing real-life bioprocess optimization problems and their solutions as examples, this book: Describes experimental design from identifying process variables to selecting a screening design, applying response surface methodology, and conducting regression modeling Demonstrates the statistical analysis and optimization of different experimental designs, the results of which are used to establish important variables and optimum settings Details the optimization techniques employed to determine optimum levels of the process variables for both single- and multiple-response systems Discusses important experimental designs, such as evolutionary operation programs and Taguchi's designs Delineates the concept of hybrid experimental design using the essence of a genetic algorithm **Statistical Optimization of Biological Systems** examines the complex nature of biological systems, the need for optimization, and the rationale of statistical and non-statistical optimization methods. More importantly, the book explains how to successfully apply mathematical and statistical techniques to the optimization of biological systems.

Biosorption Jan Derco 2018-07-18 Municipal and industrial wastewaters contain a wide spectrum of pollutants. Their effective removal presents a challenge for water treatment technology. Biosorption of nutrients and pollutants has been used in sewage treatment since the discovery of the activated sludge process. It is a passive uptake process by which pollutants are adsorbed on the surface of cell walls and/or dissolved in structures of microorganism cells that are present in sludge. Sorbed pollutants remain in the sludge and can be potentially released back into the environment depending on their condition and the reversibility of the pollutant-sludge interaction. An overview of typical biosorption applications for the removal of nutrients, organic pollutants, and metals in wastewater treatment is provided in different areas of their use for the protection of aquatic ecosystems and human health. This book will be of interest to operators of wastewater treatment plants and sludge treatment and disposal facilities as well as to researchers and university students in the field of environmental engineering. **Solid-state Fermentation** Ashok Pandey 1994 Papers presented at Specialist Group Meeting & Symposium on Solid State Fermentation, held at Trivandrum, during March 23-24, 1994, organized by the Regional Research Laboratory, Trivandrum.

Plant Tissue Culture: An Introductory Text Sant Saran Bhojwani 2013-03-20 Plant tissue culture (PTC) is basic to all plant biotechnologies and is an exciting area of basic and applied sciences with considerable scope for further research. PTC is also the best approach to demonstrate the totipotency of plant cells, and to exploit it for numerous practical applications. It offers technologies for crop improvement (Haploid and Triploid production, In Vitro Fertilization, Hybrid Embryo Rescue, Variant Selection), clonal propagation (Micropropagation), virus elimination (Shoot Tip Culture), germplasm conservation, production of industrial phytochemicals, and regeneration of plants from genetically manipulated cells by recombinant DNA technology (Genetic Engineering) or cell fusion (Somatic Hybridization and Cybridization). Considerable work is being done to understand the physiology and genetics of in vitro embryogenesis and organogenesis using model systems, especially Arabidopsis and carrot, which is likely to enhance the efficiency of in vitro regeneration protocols. All these aspects are covered extensively in the present book. Since the first book on Plant Tissue Culture by Prof. P.R. White in 1943, several volumes describing different aspects of PTC have been published. Most of these are compilation of invited articles by different experts or proceedings of conferences. More recently, a number of books describing the Methods and Protocols for one or more techniques of PTC have been published which should serve as useful laboratory manuals. The impetus for writing this book was to make available a complete and up-to-date text covering all basic and applied aspects of PTC for the students and early-career researchers of plant sciences and plant / agricultural biotechnology. The book comprises of nineteen chapters profusely illustrated with self-explanatory illustrations. Most of the chapters include

well-tested protocols and relevant media compositions that should be helpful in conducting laboratory experiments. For those interested in further details, Suggested Further Reading is given at the end of each chapter, and a Subject and Plant Index is provided at the end of the book.

Red Beet Biotechnology Bhagyalakshmi Neelwarne 2012-07-26 Biotechnology is a rapidly growing research area which is immediately translated into industrial applications. Although over 1000 research papers have emerged on various aspects of red beet and the chemistry of betalaines pigments, surprisingly no comprehensive book is available. The proposed Red Beet book encompasses a scholarly compilation of recent biotechnological research developments made in basic science, biochemistry of the chief components, technological developments in augmenting and recovery of such useful compounds and value-added products with discussions on future perspectives. The book will provide detailed information of the chemistry of the main components of normal and genetically engineered beetroot.

Proceedings of the 1st International Conference on Sustainable Waste Management through Design Harvinder Singh 2018-10-30 This book describes the latest advances, innovations and applications in the field of waste management and environmental geomechanics as presented by leading researchers, engineers and practitioners at the International Conference on Sustainable Waste Management through Design (IC_SWMD), held in Ludhiana (Punjab), India on November 2-3, 2018. Providing a unique overview of new directions, and opportunities for sustainable and resilient design approaches to protect infrastructure and the environment, it discusses diverse topics related to civil engineering and construction aspects of the resource management cycle, from the minimization of waste, through the eco-friendly re-use and processing of waste materials, the management and disposal of residual wastes, to water treatments and technologies. It also encompasses strategies for reducing construction waste through better design, improved recovery, re-use, more efficient resource management and the performance of materials recovered from wastes. The contributions were selected by means of a rigorous peer-review process and highlight many exciting ideas that will spur novel research directions and foster multidisciplinary collaboration among different waste management specialists.

Handbook on Organic Waste for Biological Treatment, Liquid Manure into a Solid, Tomato Waste Water Treatment, Oxalic Acid from Jute Stick, Cotton Processing Waste, Fish Waste, Agro-Industrial Wastes, Bioconversion of Pretreated Wheat Straw and Sunflower Stalks to Ethanol, Agricultural Waste Treatment, Waste of Dehydrated Onion, Beef-Cattle Manure Slurry, Meat Meal and Algae for Calves, Wastes from Large Piggeries, Pig Waste, Oxytetracycline, Methane from Cattle Waste Dr. Himadri Panda 2018-01-15 Handbook on Organic Waste for Biological Treatment, Liquid Manure into a Solid, Tomato Waste Water Treatment, Oxalic Acid from Jute Stick, Cotton Processing Waste, Fish Waste, Agro-Industrial Wastes, Bioconversion of Pretreated Wheat Straw and Sunflower Stalks to Ethanol, Agricultural Waste Treatment, Waste of Dehydrated Onion, Beef-Cattle Manure Slurry, Meat Meal and Algae for Calves, Wastes from Large Piggeries, Pig Waste, Oxytetracycline, Methane from Cattle Waste (Also Known as The Complete Book on Biological Waste Treatment and their Utilization) Biological Treatment is the recycling of humus, nutrients and/or energy from biological waste by means of aerobic (composting) or anaerobic (digesting) processing. Biological treatment is an important and integral part of any wastewater treatment plant that treats wastewater from either municipality or industry having soluble organic impurities or a mix of the two types of wastewater sources. Biological wastewater treatment is an important and integral step of wastewater treatment system and it treats wastewater coming from either residential buildings or industries etc. It is often called as Secondary Treatment process which is used to remove any contaminants that left over after primary treatment. Organic waste is material that is biodegradable and comes from either a plant or animal. Organic waste is usually broken down by other organisms over time and may also be referred to as wet waste. Most of the time, it's made up of vegetable and fruit debris, paper, bones and human

waste which quickly disintegrate. Wastewater treatment is a process used to convert wastewater, which is water no longer needed or suitable for its most recent use, into an effluent that can be either returned to the water cycle with minimal environmental issues or reused. Expenditure on water and wastewater infrastructure in India is set to increase by 83% over the next five years, hitting an annual run rate of \$16 billion by 2020. The utility market is set to top \$14 billion within five years, while annual spending in the industrial sector will approach \$2 billion. Spending on water supply will grow from \$5.56 billion to \$9.4 billion over the next five years. It will be a standard reference book for professionals, entrepreneurs, those studying and researching in this important area. *Separation and Purification Technologies in Biorefineries* Shri Ramaswamy 2013-02-04 Separation and purification processes play a critical role in biorefineries and their optimal selection, design and operation to maximise product yields and improve overall process efficiency. Separations and purifications are necessary for upstream processes as well as in maximising and improving product recovery in downstream processes. These processes account for a significant fraction of the total capital and operating costs and also are highly energy intensive. Consequently, a better understanding of separation and purification processes, current and possible alternative and novel advanced methods is essential for achieving the overall techno-economic feasibility and commercial success of sustainable biorefineries. This book presents a comprehensive overview focused specifically on the present state, future challenges and opportunities for separation and purification methods and technologies in biorefineries. Topics covered include: Equilibrium Separations: Distillation, liquid-liquid extraction and supercritical fluid extraction. Affinity-Based Separations: Adsorption, ion exchange, and simulated moving bed technologies. Membrane Based Separations: Microfiltration, ultrafiltration and diafiltration, nanofiltration, membrane pervaporation, and membrane distillation. Solid-liquid Separations: Conventional filtration and solid-liquid extraction. Hybrid/Integrated Reaction-Separation Systems: Membrane bioreactors, extractive fermentation, reactive distillation and reactive absorption. For each of these processes, the fundamental principles and design aspects are presented, followed by a detailed discussion and specific examples of applications in biorefineries. Each chapter also considers the market needs, industrial challenges, future opportunities, and economic importance of the separation and purification methods. The book concludes with a series of detailed case studies including cellulosic bioethanol production, extraction of algae oil from microalgae, and production of biopolymers. *Separation and Purification Technologies in Biorefineries* is an essential resource for scientists and engineers, as well as researchers and academics working in the broader conventional and emerging bio-based products industry, including biomaterials, biochemicals, biofuels and bioenergy.

Hairy Roots Vikas Srivastava 2018-11-27 The growing scale of plant-based chemicals for industrial use has generated considerable interest in developing methods to meet their desired production levels. Among various available strategies for their production, the development of *Agrobacterium rhizogenes* mediated hairy root cultures (HRCs) is generally considered the most feasible approach. Additionally, several proof-of-principle experiments have demonstrated the practical feasibility of HRCs in the plant-based remediation of environment pollutants, biotransformation of important compounds, and production of therapeutic proteins. Given that hairy root biotechnology has now been recognized as a promising and highly dynamic research area, this book offers a timely update on recent advances, and approaches hairy roots as a multifaceted biological tool for various applications. Further, it seeks to investigate the loopholes in existing methodologies, identify remaining challenges and find potential solutions by presenting well thought-out scientific discussions from various eminent research groups working on hairy root biotechnology. This book provides detailed conceptual and practical information on HRC-based research, along with relevant case studies. The content is divided into three broad sections, namely (i) Hairy Roots and Secondary Metabolism, (ii) Progressive Applications, and (iii) Novel Approaches and Future Prospects. By informing the research and teaching community about the major strides made in HRC-based interventions in

plant biology and their applications, the book is sure to spark further research in this fascinating field.

Recent Advances in Biotechnology F. Vardar-Sukan 2012-12-06 In last decades rapid scientific and engineering developments have been occurring within the context of Biotechnology. If the World Economy is to benefit fully from the advances in biosciences and biochemical engineering, it must be able to focus new knowledge on commercially appropriate targets. Modern Biotechnology is a mixture of far reaching innovation superimposed on an industrial background and it represents a means of production with bright prospects, challenging problems and stimulating competition. This NATO Advanced Study Institute on "RECENT ADVANCES IN INDUSTRIAL APPLICATIONS OF BIOTECHNOLOGY" held between September 16-27, 1991 in KuşEtdasI was the first ASI on Biotechnology in Turkey. It was aiming to provide an updated overview of the fundamental principles, novel application areas and impact of Biotechnology on international economy. Recent developments in the field of Biotechnology have been thoroughly discussed, concentrating on various interdisciplinary aspects. The illain lectures presented at the Institute covered both scientific and commercial aspects of new developments in biotechnology and discussed the possible ways of meeting the challenges of the industry. The main lectures were supplemented by Oral 2nd Poster Presentations. Thus, this volume is comprised of three sections. Part I contains the invited lectures and Part II oral presentations. Extended abstracts of poster presentations have been included in Part III to provide a more comprehensive coverage of the ASI.

Chemical Reactor Design Peter Harriott 2002-11-06 Featuring case studies and worked examples that illustrate key concepts in the text, this book contains guidelines for scaleup of laboratory and pilot plant results, methods to derive the correct reaction order, activation energy, or kinetic model from laboratory tests, and theories, correlations, and practical examples for 2- and 3-phase reaction

Advanced Methods and Mathematical Modeling of Biofilm Mojtaba Aghajani Delavar 2022-05-27 Advanced Mathematical Modelling of Biofilms and its Applications covers the concepts and fundamentals of biofilms, including sections on numerical discrete and numerical continuum models and different biofilms methods, e.g., the lattice Boltzmann method (LBM) and cellular automata (CA) and integrated LBM and individual-based model (iBM). Other sections focus on design, problem-solving and state-of-the-art modelling methods. Addressing the needs to upgrade and update information and knowledge for students, researchers and engineers on biofilms in health care, medicine, food, aquaculture and industry, this book also covers areas of uncertainty and future needs for advancing the use of biofilm models. Over the past 25-30 years, there have been rapid advances in various areas of computer technologies, applications and methods (e.g. complex programming and algorithms, lattice Boltzmann method, high resolution visualization and high-performance computation). These new and emerging technologies are providing unprecedented opportunities to develop modeling frameworks of biofilms and their applications. Introduces state-of-the-art methods of biofilm modeling, such as integrated lattice Boltzmann method (LBM) and cellular automata (CA) and integrated LBM and individual-based model (iBM) Provides recent progress in more powerful tools for a deeper understanding of biofilm complexity by implementing state-of-the-art biofilm modeling programs Compares advantages and disadvantages of different biofilm models and analyzes some specific problems for model selection Evaluates novel process designs without the cost, time and risk of building a physical prototype of the process to identify the most promising designs for experimental testing

Bioreactors Tapobrata Panda

Biotechnology in India II Tarun K. Ghose 2003-07-18 The biotechnology business in India with an increase from USD 500 million in 1997 and reaching an estimated USD 1 billion next year health related products accounting for 60%, agro and veterinary products together 15%, and contract R&D, reagents, devices and supplies adding up to the remaining 25% of which the diagnostics share was about 10% of the total surely presented an encouraging picture even five years ago. While volumes have increased, the pattern has not. According to a report, prepared

by McKinsey & Co, India's Pharmaceutical industry including domestic and export sales and contract services totals nearly USD 5 billion. Furthermore, the company optimistically projects the growth to a factor of five fold only if both the industry and the government are able to put in place achievable solutions that must take care of the formidable obstacles preventing further growth. If this assessment is correct, then the established transformation made by IT growth should also provide the confidence required by the high expectations for biotechnology which have arisen in the country in recent years. Some contributors to this are overenthusiastic these are bureaucrats, some retired scientists and of course the complacent politicians who have the least knowledge of what the new biotechnology is all about. However, there are clear indications of biotechnology growth demonstrated by a few but rapidly expanding biotech companies such as Biocon Ltd, Shantha Biotech (P) Ltd, Dr.

New Horizons in Biotechnology S. Roussos 2013-06-29 The practice of biotechnology, though different in style, scale and substance in globalizing science for development involves all countries. Investment in biotechnology in the industrialised, the developing, and the least developed countries, is now amongst the widely accepted avenues being used for economic development. The simple utilization of kefir technology, the detoxification of injurious chemical pesticides e.g. parathion, the genetic tailoring of new crops, and the production of a first of a kind of biopharmaceuticals illustrate the global scope and content of biotechnology research endeavour and effort. In the developing and least developed nations, and in which the 9 most populous countries are encountered, problems concerning management of the environment, food security, conservation of human health resources and capacity building are important factors that influence the path to sustainable development. Long-term use of biotechnology in the agricultural, food, energy and health sectors is expected to yield a windfall of economic, environmental and social benefits. Already the prototypes of new medicines and of prescription fruit vaccines are available. Gene based agriculture and medicine is increasingly being adopted and accepted. Emerging trends and practices are reflected in the designing of more efficient bioprocesses, and in new research in enzyme and fermentation technology, in the bioconversion of agro industrial residues into bio-utility products, in animal healthcare, and in the bioremediation and medical biotechnologies. Indeed, with each new day, new horizons in biotechnology beckon.

Metabolic Regulation and Metabolic Engineering for Biofuel and Biochemical Production Kazuyuki Shimizu 2017-07-12 The global warming problem is becoming critical year by year, causing climate disaster all over the world, where it has been believed that the CO₂ gas emitted from the factories and the burning of fossil fuels may be one of the reasons of global warming. Moreover, the global stock of fossil fuels is limited, and may run out soon within several tens of years. Although wind, geo-thermal, and tide energies have been considered as clean energy sources, those depend on the land or sea locations and subject to the climate change. Biofuel and biochemical production from renewable bio-resources has thus been paid recent attention from environmental protection and energy production points of view, where the current chemical and energy producing plants can be also utilized with slight modification. The so-called 1st generation biofuels have been produced from corn starch and sugarcane in particular in USA and Brazil. However, this causes the problem of the so-called "food and energy issues" as the production scale increases. The 2nd generation biofuel production from lingo-cellulosic biomass or wastes has thus been paid recent attention. However, it requires energy intensive pretreatment for the degradation of lingo-cellulosic biomass, and the fermentation is slow due to low growth rate, and thus the productivity of biofuels and bio-chemicals is low. The 3rd generation biofuel production from photosynthetic organisms such as cyanobacteria and algae has been also paid attention, because such organisms can grow with only sun light and CO₂ in the air, but the cell growth rate and thus the productivity of the fuels is significantly low. The main part or core of such production processes is the fermentation by micro-organisms. In particular, it is critical to properly understand the cell metabolism followed by the efficient metabolic engineering. The book gives comprehensive explanation of the

cell metabolism and the metabolic regulation mechanisms of a variety of micro-organisms. Then the efficient

metabolic engineering approaches are explained to properly design the microbial cell factories for the efficient cell growth and biofuel and biochemical production.