Mammalian Cell Culture Zip

Large-Scale Mammalian Cell Culture is composed of papers presented as part of a symposium sponsored by the American Chemical Society Division of Microbial and Biochemical Technology at the 188th American Chemical Society National Meeting, held at Philadelphia, Pa., on Aug. 27, 1984. A rapid development of large-scale mammalian cell culture technology for the production of biologically important molecules becomes apparent. This book looks into this technology, its potential for commercial application, and the regulatory concerns posed by its use for the production of human therapeutics.

Offers a comprehensive overview of cell culture engineering, providing insight into cell engineering, systems biology approaches and processing technology In Cell Culture Engineering: Recombinant Protein Production, editors Gyun Min Lee and Helene Faustrup Kildegaard assemble top class authors to present expert coverage of topics such as: cell line development for therapeutic protein production; development of a transient gene expression upstream platform; and CHO synthetic biology. They provide readers with everything they need to know about enhancing product and bioprocess attributes using genome-scale models of CHO metabolism; omics data and mammalian systems biotechnology; perfusion culture; and much more. This all-new, up-to-date reference covers all of the important aspects of cell culture engineering, including cell engineering, system biology approaches, and processing technology. It describes the challenges in cell line development and cell engineering, e.g. via gene editing tools like CRISPR/Cas9 and with the aim to engineer glycosylation patterns. Furthermore, it gives an overview about synthetic biology approaches applied to cell culture engineering and elaborates the use of CHO cells as common cell line for protein production. In addition, the book discusses the most important aspects of production processes, including cell culture media, batch, fed-batch, and perfusion processes as well as process analytical technology, quality by design, and scale down models. -Covers key elements of cell culture engineering applied to the production of recombinant proteins for therapeutic use -Focuses on mammalian and animal cells to help highlight synthetic and systems biology approaches to cell culture engineering, exemplified by the widely used CHO cell line -Part of the renowned "Advanced Biotechnology" book series Cell Culture Engineering: Recombinant Protein Production will appeal to biotechnologists, bioengineers, life scientists, chemical engineers, and PhD students in the life sciences.

Volumes are organized topically and provide a comprehensive discussion of developments in the respective field over the past 3-5 years. The series also discusses new discoveries and applications. Special volumes are dedicated to selected topics which focus on new biotechnological products and new processes for their synthesis and purification. In general, special volumes are edited by well-known guest editors. The series editor and publisher will however always be pleased to receive suggestions and supplementary information. Manuscripts are accepted in English.

Basics and Applications

Large-Scale Mammalian Cell Culture

Perfusion Cell Culture Processes for Biopharmaceuticals

Handbook of Industrial Cell Culture

Comparative Growth of Mammalian, Insect and Plant Cells

Mammalian cell lines command an effective monopoly for the production of therapeutic proteins that require post-translational modifications. This unique advantage outweighs the costs associated with mammalian cell culture, which are far grater in terms of development time and manufacturing when compared to microbial culture. The development of cell lines has undergone several advances over the years, essentially to meet the requirement to cut the time and costs associated with using such a complex hosts as production platforms. This book provides a comprehensive guide to the methodology involved in the development of cell lines and the cell engineering approach that can be employed to enhance productivity, improve cell function, glycosylation and secretion and control apoptosis. It presents an overall picture of the current topics central to expression engineering including such topics as epigenetics and the use of technologies to overcome positional dependent inactivation, the use of promoter and enhancer sequences for expression of various transgenes, site directed engineering of defined chromosomal sites, and examination of the role of eukaryotic nucleus as the controller of expression of genes that are introduced for production of a desired product. It includes a review of selection methods for high producers and an application developed by a major biopharmaceutical industry to expedite the cell line development process. The potential of cell engineering approch to enhance cell lines through the manipulation of single genes that play important roles in key metabolic and regulatory pathways is also explored throughout.

Animal cell culture is an important laboratory technique in the biological and medical sciences. It has become an essential tool for the study of most biochemical and physiological processes and the use of large-scale animal cell culture has become increasingly important to the commercial production of specific compounds for the pharmaceutical industry. This book describes the basic requirements for establishing and maintaining cell cultures both in the laboratory and in large-scale operations. Minimal background knowledge of the subject is assumed and therefore it will be a readable introduction to animal cell culture for undergraduates, graduates and experienced researchers. Reflecting the latest developments and trends in the field, the new topics include the latest theory of the biological clock of cell lines, the development of improved serum-free media formulations, the increased understanding of the importance and control of protein glycosylation, and the humanization of antibodies for therapeutic use. It is a pleasure to contribute the foreword to Introduction to Cell and Tissue Culture:

The ory and Techniques by Mather and Roberts. Despite the occasional appearance of thought ful works devoted to elementary or advanced cell culture methodology, a place remains for a comprehensive and definitive volume that can be used to advantage by both the novice and the expert in the field. In this book, Mather and Roberts present the relevant method ology within a conceptual framework of cell biology, genetics, nutrition, endocrinology, and physiology that renders technical cell culture information in a comprehensive, logical for mat. This allows topics to be presented with an emphasis on troubleshooting problems from a basis of understanding the underlying theory. The material is presented in a way that is adaptable to student use in formal courses; it also should be functional when used on a daily basis by professional cell culturists in a- demia and industry. The volume includes references to relevant Internet sites and other use ful sources of information. In addition to the fundamentals, attention is also given to mod ern applications and approaches to cell culture derivation, medium formulation, culture scale-up, and biotechnology, presented by scientists who are pioneers in these areas. With this volume, it should be possible to establish and maintain a cell culture laboratory devot ed to any of the many disciplines to which cell culture methodology is applicable.

Process Scale Purification of Antibodies

Carcinogenic and Cytological Assessment of Mammalian Cell Culture

Cell Culture and Its Application

Cell and Tissue Culture

Cell Culture Engineering

The Second International Cell Culture Congress was structured as was the First Congress to bring together scientists from academia and industry to discuss the use of cell culture in support of bioscience. It was felt that a forum whereby state-of the-art presentations were followed by informal workshops would provide opportunity for the greatest exchange of information. Within the atmosphere of the workshop, problems common to basic as well as applied research were discussed and directions for the future were brought to light. These proceedings reflect and epitomize those discussions. Although it is difficult to cover all scientific disciplines utilizing cells in culture, we feel key areas were addressed at the Congress and are herein presented. Considerable emphasis has been given to the methods for establishing cells in culture and characterizing the cells once established as well as the improved technology for growing established cell lines. Examples of how recombinant DNA technology is being used to manipulate genes within mammalian cells, to clone mammalian genes and to insert them in prokaryotes has been included. Major emphasis has been given to the use of lymphocytes in culture for understanding immune responsiveness and the culturing of a variety of cell types as a means to understand disease states.

This book presents a comprehensive treatment of the genetic analysis of mammalian cells cultured as independent microorganisms. It bridges the gap between introductory texts and advanced works which describe selected aspects of the subject.

At some point in their careers, virtually every scientist and technician, as well as many medical professionals, regardless of their area of specialization have a need to utilize cell culture systems. Updating and significantly expanding upon the previous editions, Basic Cell Culture Protocols, Fourth Edition provides the novice cell culturist with sufficient information to perform the basic techniques, to ensure the health and identity of their cell lines, and to be able to isolate and culture specialized primary cell types. The intent of this extensive volume is to generate a valuable resource containing clear methodologies pertinent to current areas of investigation, rather than attempting to educate cell culturists on specific cell types or organ systems. Written in the highly successful Methods in Molecular BiologyTM, chapters include introductions to their respective topics, lists of the necessary materials and reagents, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Comprehensive and up-to-date, Basic Cell Culture Protocols, Fourth Edition compiles the essential techniques needed to approach this vital laboratory activity with full success.

Animal Cell Culture and Technology

Large-scale Mammalian Cell Culture

Edited by Robert E. Stevenson

Process Development, Design, and Scale-up

WNT/Frizzled Signaling in Mammalian Cell Culture and Mouse Mammary Tissue

The completion of the Human Genome Project and the rapid progress in cell bi- ogy and biochemical engineering, are major forces driving the steady increase of approved biotech products, especially biopharmaceuticals, in the market. Today mammalian cell products ("products from cells"), primarily monoclonals, cytokines, recombinant glycoproteins, and, increasingly, vaccines, dominate the biopharmaceutical industry. Moreover, a small number of products consisting of in vitro cultivated cells ("cells as product") for regenerative medicine have also been introduced in the market. Their efficient production requires comprehensive knowledge of biological as well as biochemical mammalian cell culture fundamentals (e.g., cell characteristics and metabolism, cell line establishment, culture medium optimization) and related engineering principles (e.g., bioreactor design, process scale-up and

optimization). In addition, new developments focusing on cell line development, animal-free c- ture media, disposables and the implications of changing processes (multi-purpo- facilities) have to be taken into account. While a number of excellent books treating the basic methods and applications of mammalian cell culture technology have been published, only little attention has been afforded to their engineering aspects. The aim of this book is to make a contribution to closing this gap; it particularly focuses on the interactions between biological and biochemical and engineering principles in processes derived from cell cultures. It is not intended to give a c- prehensive overview of the literature. This has been done extensively elsewhere.
Promoting a continued and much-needed renaissance in biopharmaceutical manufacturing, this book covers the different strategies and assembles top-tier technology experts to address the challenges of antibody purification. • Updates existing topics and adds new ones that include purification of antibodies produced in novel production systems, novel separation technologies, novel antibody formats and alternative scaffolds, and strategies for ton-scale manufacturing • Presents new and updated discussions of different purification technologies, focusing on how they can address the capacity crunch in antibody purification • Emphasizes antibodies and innovative chromatography methods for processing
An interdisciplinary approach, integrating biochemistry, biology, genetics, and engineering for the effective production of protein pharmaceuticals. The volume offers a biological perspective of large-scale animal cell culture and examines diverse processing strategies, process management, regulator
Applications in Process Development and Characterization
Introduction to Cell and Tissue Culture

Cell Culture Technology for Pharmaceutical and Cell-Based Therapies
Eukaryotic Cell Cultures
Transcriptome Analysis, by Frank Stahl, Bernd Hitzmann, Kai Mutz, Daniel Landgrebe, Miriam Lübbecke, Cornelia Kasper, Johanna Walter und Thomas Scheper Transcriptome Data Analysis for Cell Culture Processes, by Marlene Castro-Melchor, Huong Le und Wei-Shou Hu Modeling Metabolic Networks for Mammalian Cell Systems: General Considerations, Modeling Strategies, and Available Tools, by Ziomara P. Gerdtzen Metabolic Flux Analysis in Systems Biology of Mammalian Cells, by Jens Niklas und Elmar Heinzle Advancing Biopharmaceutical Process Development by System-Level Data Analysis and Integration of Omics Data, by Jochen Schaub, Christoph Clemens, Hitto Kaufmann und Torsten W. Schulz Protein Glycosylation and Its Impact on Biotechnology, by Markus Berger, Matthias Kaup und Véronique Blanchard Protein Glycosylation Control in Mammalian Cell Culture: Past Precedents and Contemporary Prospects, by Patrick Hossler Modeling of Intracellular Transport and Compartmentation, by Uwe Jandt und An-Ping Zeng Genetic Aspects of Cell Line Development from a Synthetic Biology Perspective, by L. Botezatu, S. Sievers, L. Gama-Norton, R. Schucht, H. Hauser und D. Wirth.
Medicines from Animal Cell Culture focuses on the use of animal cell culture, which has been used to produce human and veterinary vaccines, interferon, monoclonal antibodies and genetically engineered products such as tPA and erythropoietin. It also addresses the rece dramatic expansion in cell-based therapies, including the use of live cells for tissue regeneration and the culture of stem cells. Medicines from Animal Cell Culture: Provides comprehensive descriptions of methods for cell culture and nutrition as well as the technologies for the preservation and characterisation of both the cells and the derived products Describes the preparation of stem cells and others for use in ce based therapies – an area of burgeoning research Includes experimental examples to indicate expected results Covers regulatory issues from the UK, the EU and the USA and reviews how these are developing around the world Addresses the key issues of standardisation and validation with chapters on GLP and GMP for cell culture processes Delivering insight into the exciting world of biological medicines and directions for further investigation into specific topics, Medicines from Animal Cell Culture is an essential resource for researchers and technicians at all levels using cell culture within the pharmaceutical, biotechnology and biomedical industries. It is of value to laboratory managers in these industries and to all those interested in this topic alike.
Edited by two of the most distinguished pioneers in genetic manipulation and bioprocess technology, this bestselling reference presents a comprehensive overview of current cell culture technology used in the pharmaceutical industry. Contributions from several leading researchers showcase the importance of gene discovery and genomic technology devel
Mammalian Cell Genetics
Cell and Tissue Reaction Engineering
The Development of Transfection Reagent for Mammalian Cell Culture
Advanced Materials Science Principles
Simulation and Use of a Centrifugal Bioreactor for Mammalian Cell and Tissue Culture
Cell culture is extensively employed in the biotechnological and pharmaceutical industries for the production of antiviral vaccines, monoclonal antibodies, recombinant proteins, secondary metabolites and in vitro cultivated cells. This technique is successfully applied to the growth of cell lines isolated from different species of mammals, insects and plants. In order to optimize cell growth and product yield, it is essential to study the metabolism of each cell line to allow for the adjustment of the growth conditions and culture medium composition accordingly. Through the compilation of open access articles, the present book provides numerous examples of the in vitro cultivation of different mammalian, insect and plant cell lines, as well as their biotechnological applications. In Chapter number 1, the editor discusses the composition of mammalian, insect and plant cell culture media based on the metabolic requirements of these organisms. The first block of nine chapters presents cell culture experiments with different mammalian cell lines. The authors of the study shown in Chapter 2 assayed three different 3T3 fibroblast subculture schemes to investigate their effect on the proliferative feeder contamination of target cells. In Chapter 3, the obtaining of low pathogenic influenza virus replication in BHK-21 cells is achieved through the expression of a chicken embryo factor X. The optimized production of human immunoglobulin G in CHO cells under doxycycline induction is investigated in Chapter 4. In Chapter 5, the effect of temperature on recombinant protein production is studied in HEK-293 cells. The authors of the study presented in Chapter 6 cultured HeLa cells in 3D through the electrospinning of a nanostructured polymer grid. In Chapter 7, the erythroid-specific ALAS isozyme is expressed in K562 cells to study the accumulation of the heme precursor PPIX, as well as the cell death rate caused by this protein. In Chapter 8, the effect of long-term culture of MDCK cells on the number of chromosomes is investigated. A mathematical model for the GS-NS0 cell cycle progression is described in Chapter 9. Finally, different Vero cell cultivation methods are assayed to optimize poliovirus D-antigen yields in the study presented in Chapter 10. The second block of five chapters deals with insect cell culture. The authors of the study shown in Chapter 11 generated primary cell cultures and individual cell lines from eggs of the moth Ascalapha odorata and

measured the production of recombinant alkaline phosphatase and β-galactosidase in this system. A transcriptome analysis of High-Five cells aimed at optimizing the secretion of recombinant proteins by using the baculovirus expression system is presented in Chapter 12. In Chapter 13, a method for the ultrastructural analysis of mitosis in S2 cells is described. The effect of the hormone agonists methoxyfenozide and methoprene on Sf9 proliferation is examined in Chapter 14. Finally, the study presented in Chapter 15 shows the production of Chikunguya virus E1 and E2 glycoproteins in Sf21 cells. The last block of six chapters explores the in vitro culture and biotechnological applications of plant cells. In Chapter 16, the epigenetic instability of immortalized Arabidopsis cells is investigated. The cloning of BY-2 cells is employed to reduce heterogeneous expression of transgenes in Chapter 17. In Chapter 18, Catharanthus roseus cells are treated with UV-B to increase the production of catharanthine and vindoline. In Chapter 19, a large-scale statistical experiment is performed to identify the cultivation factors that most severely affect geraniol production in tobacco NN cells. In Chapter 20, several signaling peptides are tested in order to optimize recombinant protein secretion in rice cells. Finally, the molecular genetics of the anticancer agent paclitaxel (Taxol(R)) are investigated in Taxus cuspidata cells through the identification of genes with altered expression in response to the elicitor methyl jasmonate. The present book provides college students, teachers, researchers, workers of the pharmaceutical and biotechnological industries and other readers interested in cell biology and biotechnology with a detailed overview of the biotechnological applications of mammalian, insect and plant cells and the factors influencing cell growth and recombinant protein yield.

This book focuses on advances made in both materials science and scaffold development techniques, paying close attention to the latest and state-of-the-art research. Chapters delve into a sweeping variety of specific materials categories, from composite materials to bioactive ceramics, exploring how these materials are specifically designed for regenerative engineering applications. Also included are unique chapters on biologically-derived scaffolding, along with 3D printing technology for regenerative engineering. Features: Covers the latest developments in advanced materials for regenerative engineering and medicine. Each chapter is written by world class researchers in various aspects of this medical technology. Provides unique coverage of biologically derived scaffolding. Includes separate chapter on how 3D printing technology is related to regenerative engineering. Includes extensive references at the end of each chapter to enhance further study.

This second edition of the bestselling Manual of Industrial Microbiology and Biotechnology brings together in one place the biological and engineering methodologies required to develop a successful industrial process, from culture isolation and development to useful product. The editors have enlisted a broad range of experts, including microbial ecologists, physiologists, geneticists, biochemists, molecular biologists, and biochemical engineers. This comprehensive perspective provides a valuable "how to" resource, the structure of which resembles the sequence of operations involved in the development of a commercial biological process and product.

Cell Culture Bioprocess Engineering, Second Edition

Regenerative Engineering

Development & Applications of Novel Condition for Mammalian Cell Culture

Syverton Memorial Symposium: Analytic Cell Culture

New Aspects of Chitosan in Cell Culture

Basic Science Methods for Clinical Researchers addresses the specific challenges faced by clinicians without a conventional science background. The aim of the book is to introduce the reader to core experimental methods commonly used to answer questions in basic science research and to outline their relative strengths and limitations in generating conclusive data. This book will be a vital companion for clinicians undertaking laboratory-based science. It will support clinicians in the pursuit of their academic interests and in making an original contribution to their chosen field. In doing so, it will facilitate the development of tomorrow's clinician scientists and future leaders in discovery science. Serves as a helpful guide for clinical researchers who lack a conventional science background Organized around research themes pertaining to key biological molecules, from genes, to proteins, cells, and model organisms Features protocols, techniques for troubleshooting common problems, and an explanation of the advantages and limitations of a technique in generating conclusive data Appendices provide resources for practical research methodology, including legal frameworks for using stem cells and animals in the laboratory, ethical considerations, and good laboratory practice (GLP)

This book is the culmination of three decades of accumulated experience in teaching biotechnology professionals. It distills the fundamental principles and essential knowledge of cell culture processes from across many different disciplines and presents them in a series of easy-to-follow, comprehensive chapters. Practicality, including technological advances and best practices, is emphasized. This second edition consists of major updates to all relevant topics contained within this work. The previous edition has been successfully used in training courses on cell culture bioprocessing over the past seven years. The format of the book is well-suited to fast-paced learning, such as is found in the intensive short course, since the key take-home messages are prominently highlighted in panels. The book is also well-suited to act as a reference guide for experienced industrial practitioners of mammalian cell cultivation for the production of biologics.

Cell Culture and Its Application covers the proceedings of the First International Cell Culture Congress Symposium, which focuses on how cell culture technology could impact on cell biology. The symposium aims to establish facilities for the cultivation of mammalian cells, which in turn would hopefully enhance basic cell biology research. The book is organized into four symposium and workshop sessions, encompassing 45 chapters. The opening chapter recognizes the interlocking relationship of cell culture technology and substantive cell biology. Chapters 2-5 describe the biochemical events that mark the cell cycle, with emphasis on occurrence of histone phosphorylation at each cycle. A discussion on cell differentiation, as a phenomena of interacting, inductive, and inhomogeneous cell populations, is included in these chapters. The second symposium session deals with signs of a revolution in progress in cell culture technology. This includes impact of tissue culture in physiological research course and in understanding of integrated physiology. The last two symposium sessions cover the large-scale production of virus from tissue cultures for cell antigens.

An approach to the study of aging using diploid human cells in culture as a model system is also presented. It involves isolation and characterization of HLA antigens from cultured cells and their contribution to the study of disease. A brief discussion on mycoplasma contamination, microplasma-cell-virus interaction, and advantages and limitations of direct and indirect culture for primary isolation and detection of mycoplasma contamination is provided. The book then proceeds by discussing cell differentiation of specific cell or organ, such as testis, sensory cell, hepatocyte, embryonic muscle cell, and brain cortex. The concluding chapters cover nutritional requirements for cell growth, defined culture media for specific cell type, issues and problems related to large-scale cell production, and quality control. Cell biologists and researchers will find this book invaluable.

Readings in Mammalian Cell Culture

Growth, Nutrition, and Metabolism of Cells in Culture

Animal Cell Culture

Medicines from Animal Cell Culture

Recombinant Protein Production

Animal cells are the preferred “ cell factories ” for the production of complex molecules and antibodies for use as prophylactics, therapeutics or diagnostics. Animal cells are required for the correct post-translational processing (including glycosylation) of biopharmaceutical protein products. They are used for the production of viral vectors for gene therapy. Major targets for this therapy include cancer, HIV, arthritis, cardiovascular and CNS diseases and cystic fibrosis. Animal cells are used as in vitro substrates in pharmacological and toxicological studies. This book is designed to serve as a comprehensive review of animal cell culture, covering the current status of both research and applications. For the student or R&D scientist or new researcher the protocols are central to the performance of cell culture work, yet a broad understanding is essential for translation of laboratory findings into the industrial production. Within the broad scope of the book, each topic is reviewed authoritatively by experts in the field to produce state-of-the-art collection of current research. A major reference volume on cell culture research and how it impacts on production of biopharmaceutical proteins worldwide, the book is essential reading for everyone working in cell culture and is a recommended volume for all biotechnology libraries.

This book is a monography about perfusion cell cultures for the production of biopharmaceuticals, such as therapeutic proteins (i.e. biomolecules like monoclonal antibodies), and describes the fundamentals, design and operation of these processes. Context is given in the first chapters to understand the state-of-the-art of the technology. We then give an overview of the challenges and objectives in operating mammalian cell perfusion cultures and provide guidelines for the design and setup of lab-scale bioreactor systems, and the required control structure to achieve stable operation. Scale-down devices and PAT tools are described in the context of continuous manufacturing and guidelines for process optimization are given using a variety of case studies to illustrate different approaches. Scale-up is also adressed with a strong focus on bioreactor aeration and mixing, shear stress and cell retention device. Finally, a general introduction for the application of mechanistic and statistic models in bioreactor process development and optimization is given in the last chapter.

A diverse team of researchers, technologists, and engineers describe, in simple and practical language, the major current and evolving technologies for improving the biocatalytic capabilities of mammalian, microbial, and plant cells. The authors present state-of-the-art techniques, proven methods, and strategies for industrial screening, cultivation, and scale-up of these cells, and describe their biotech and industrial uses. Special emphasis is given to the solving critical issues encountered during the discovery of new drugs, process development, and the manufacture of new and existing compounds. Other topics include recombinant protein expression, bioinformatics, high throughput screening, analytical tools in biotechnology, DNA shuffling, and genomics discovery.

Controlled Particle Production by Membrane Emulsification for Mammalian Cell Culture and Release

Manual of Industrial Microbiology and Biotechnology

Basic Science Methods for Clinical Researchers

Alginate-based Microcapsules for Mammalian Cell Culture and Other Biotechnological Applications

Transcriptome Analysis in Mammalian Cell Culture

This is a comprehensive research guide that describes both the key new techniques and more established methods. Every chapter discusses the merits and limitations of the various approaches and then provides selected tried-and-tested protocols, as well as a plethora of good practical advice, for immediate use at the bench. It presents the most accessible and comprehensive introduction available to the culture and experimental manipulation of animal cells. Detailed protocols for a wide variety of methods provide the core of each chapter, making new methodology easily accessible. This book is an essential laboratory manual for all undergraduates and graduates about to embark on a cell culture project. It is a book which both experienced researchers and those new to the field will find invaluable.

Large-Scale Mammalian Cell Culture TechnologyRoutledge

Molecular Biology of the Cell

Large-Scale Mammalian Cell Culture Technology

Cell Line Development

Essential Methods

Genomics and Systems Biology of Mammalian Cell Culture