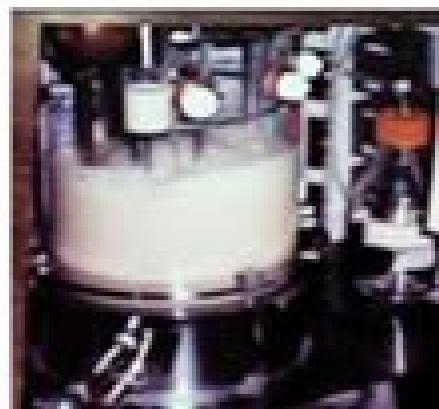
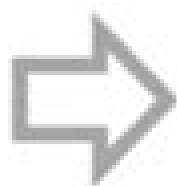
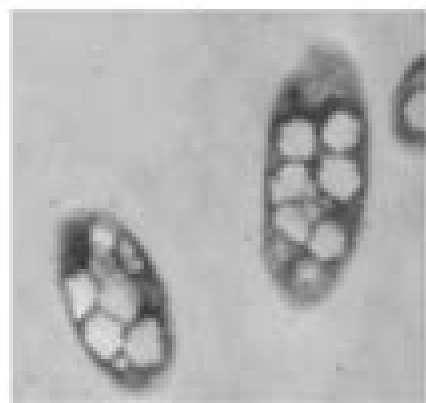
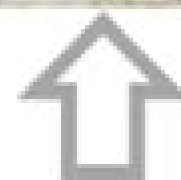
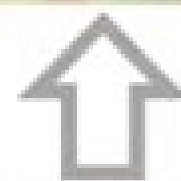
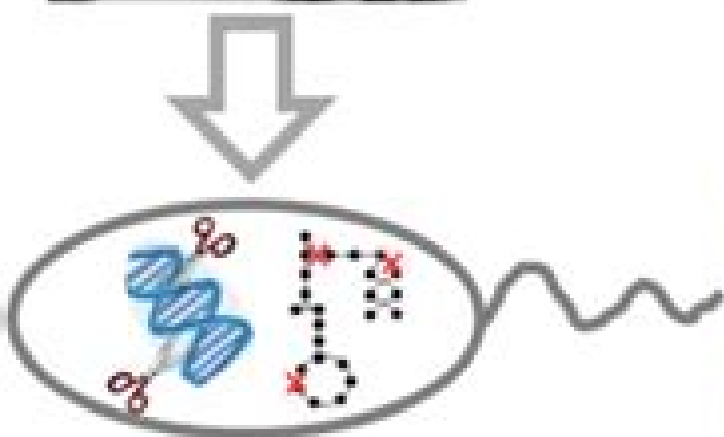




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Microbial Polyesters

**Sudhir Pratap Singh, Santosh Kumar
Upadhyay**



Microbial Polyesters:

Microbial Polyesters Yoshiharu Doi,1990 *Microbial Biopolyester Production, Performance and Processing Bioengineering, Characterization, and Sustainability* Martin Koller,2016-12-06 Global plastic production is estimated to be over 300Mt annually Most conventional plastics are predominantly produced from fossil fuels and are highly resistant to biodegradation and only a small share of about 20% of spent plastics is believed to be recycled which is a cause for environmental concern Biodegradable plastics would solve this concern as they are a sustainable alternative yet these do not even cover 5% of the global plastic market Microbial polyhydroxyalkanoates PHAs are a versatile group of polyesters produced by nature as prokaryotic storage materials PHAs can be produced through sustainable bioprocess engineering and have displayed remarkable flexibility in their physical and chemical properties PHAs are the subject of several scientific papers and numerous PHA patents have also been filed generating significant interest in the plastic production industry To develop overall sustainable and efficient production processes all bioprocess steps need to be thoroughly understood and accounted for These processes start with the selection of suitable inexpensive raw materials microbes and enzymes optimizing the process engineering and process regime and conclude with the enhancement of product recovery in terms of time energy and material input Microbial Biopolyester Production Performance and Processing Bioengineering Characterization and Sustainability is a compilation of eight chapters covering bacterial polyesters green plastics and PHAs from various angles The contents of this volume focus on sustainable practices focus on the sustainability of processes that involve the synthesis and recycling of these materials The volume is a useful resource for bioprocess engineers microbiologists biotechnologists and chemical engineers interested in the basics of biodegradable plastic production

Biopolyesters Wolfgang Babel,Alexander Steinbüchel,2003-07-01 Living systems synthesize seven different classes of polymers They provide structure and form for cells and organisms function as catalysts and energy storage and carry the genetic information All these polymers possess technically interesting properties Some of these biopolymers are already used commercially This special volume of *Advances in Biochemical Engineering Biotechnology* comprises 10 chapters It gives an overview of the water insoluble biopolyesters in particular of the microbially synthesized poly hydroxyalkanoate PHA family It reports the state of the art of metabolism regulation and genetic background the latest advances made in genetic optimization of bacteria construction of transgenic plants and in vitro synthesis by means of purified enzymes Furthermore it describes relevant technologies and evaluates perspectives concerning increasing the economic viability and competitiveness of PHA and discusses applications in medicine packaging food and other fields **Microbial Biotechnology** Mr. Rohit Manglik,2024-07-03 EduGorilla Publication is a trusted name in the education sector committed to empowering learners with high quality study materials and resources Specializing in competitive exams and academic support EduGorilla provides comprehensive and well structured content tailored to meet the needs of students across various streams and levels

Biodegradable Polyesters Stoyko Fakirov, 2015-04-06 Collating otherwise hard to get and recently acquired knowledge in one work this is a comprehensive reference on the synthesis properties characterization and applications of this eco friendly class of plastics A group of internationally renowned researchers offer their first hand experience and knowledge dealing exclusively with those biodegradable polyesters that have become increasingly important over the past two decades due to environmental concerns on the one hand and newly devised applications in the biomedical field on the other The result is an unparalleled overview for the industrial chemist and materials scientist as well as for developers and researchers in industry and academia alike

Renewable Resources for Functional Polymers and Biomaterials Peter A Williams, 2015-11-09 This book details polysaccharides and other important biomacromolecules covering their source production structures properties and current and potential application in the fields of biotechnology and medicine It includes a systematic discussion on the general strategies of isolation separation and characterization of polysaccharides and proteins Subsequent chapters are devoted to polysaccharides obtained from various sources including botanical algal animal and microbial In the area of botanical polysaccharides separate chapters are devoted to the sources structure properties and medical applications of cellulose and its derivatives starch and its derivatives pectins and exudate gums notably gum arabic Another chapter discusses the potential of hemicelluloses xylans and xylan derivatives as a new source of functional biopolymers for biomedical and industrial applications The algal polysaccharide alginate has significant application in food pharmaceuticals and the medical field all of which are reviewed in a separate chapter Polysaccharides of animal origin are included with separate chapters on the sources production biocompatibility biodegradability and biomedical applications of chitin chitosan and hyaluronan With the increasing knowledge and applications of genetic engineering there is also an introduction in the book to nucleic acid polymers the genome research and genetic engineering Proteins and protein conjugates are covered with one chapter providing a general review of structural glycoproteins fibronectin and laminin together with their role in the promotion of cell adhesion in vascular grafts implants and tissue engineering Another chapter discusses general aspects of a number of industrial proteins including casein caseinates whey protein gluten and soy proteins with emphasis on their medical applications and with reference to the potential of bacterial proteins Another natural polymer resource microbial polyesters although small compared with polysaccharides and proteins is also gaining increasing interest in biomedical technology and other industrial sectors One chapter therefore is devoted to microbial polyesters with comprehensive coverage of their biosynthesis properties enzymic degradation and applications By dealing with biopolymers at the molecular level the book is aimed at the biomedical and wider materials science communities and provides an advanced overview of biopolymers at the graduate and postgraduate level In addition it will appeal to both academic and industrial life scientists who are involved in research and development activities in the medical and biotechnology field

Biodegradable polymers for industrial applications Ray Smith, 2005-05-17 The vast majority of plastic products are made from petroleum

based synthetic polymers that do not degrade in a landfill or in a compost like environment Therefore the disposal of these products poses a serious environmental problem An environmentally conscious alternative is to design synthesise polymers that are biodegradable Biodegradable polymers for industrial applications introduces the subject in part one by outlining the classification and development of biodegradable polymers with individual chapters on polyhydroxyalkanoates polyesteramides and thermoplastic starch biodegradable polymers and others The second part explores the materials available for the production of biodegradable polymers Polymers derived from sugars natural fibres renewable forest resources poly lactic acid and protein nanoparticle composites will be looked at in detail in this section Part three looks at the properties and mechanisms of degradation prefacing the subject with a chapter on current standards The final part explores opportunities for industrial applications with chapters on packing agriculture and biodegradable polycaprolactone foams in supercritical carbon dioxide Biodegradable polymers for industrial applications explores the fundamental concepts concerning the development of biodegradable polymers degradable polymers from sustainable sources degradation and properties and industrial applications It is an authoritative book that will be invaluable for academics researchers and policy makers in the industry

Durability and Reliability of Medical Polymers Mike Jenkins, Artemis Stamboulis, 2012-08-13 Given the widespread use of polymers in medical devices the durability and reliability of this material in use is an area of critical importance Durability and reliability of medical polymers reviews the performance of both bioresorbable and non bioresorbable medical polymers Part one provides a review of the types and properties of bioresorbable medical polymers The effect of molecular structure on properties is discussed along with the processing of bioresorbable and other polymers for medical applications Transport phenomena and the degradation of bioresorbable medical polymers are reviewed before an exploration of synthetic bioresorbable polymers and their use in orthopaedic tissue regeneration Part two goes on to explore the durability and reliability of non bioresorbable medical polymers and wear processes in polymer implants and ageing processes of biomedical polymers in the body are discussed in depth before an investigation into manufacturing defects and the failure of synthetic polymeric medical devices With its distinguished editors and international team of expert contributors Durability and reliability of medical polymers is an essential tool for all materials scientists researchers and engineers involved in the design development and application of medical polymers whilst also providing a helpful overview of the subject for biologists chemist and clinicians Comprehensively examines the performance of both bioresorbable and non bioresorbable medical polymers Discusses the processing of bioresorbable and other polymers for medical applications before reviewing the degradation of bioresorbable medical polymers Explores the durability and reliability of non bioresorbable medical polymers and discusses wear processes in polymer implants and ageing processes of biomedical polymers in the body

Microbial Degradation of Xenobiotics Shree Nath Singh, 2011-10-07 Our interest in the microbial biodegradation of xenobiotics has increased many folds in recent years to find out sustainable ways for

environmental cleanup Bioremediation and biotransformation processes harness the naturally occurring ability of microbes to degrade transform or accumulate a wide range of organic pollutants Major methodological breakthroughs in recent years through detailed genomic metagenomic proteomic bioinformatic and other high throughput analyses of environmentally relevant microorganisms have provided us unprecedented insights into key biodegradative pathways and the ability of organisms to adapt to changing environmental conditions The degradation of a wide spectrum of organic pollutants and wastes discharged into the environment by anthropogenic activities is an emerging need today to promote sustainable development of our society with low environmental impact Microbial processes play a major role in the removal of recalcitrant compounds taking advantage of the astonishing catabolic versatility of microorganisms to degrade or transform such compounds New breakthroughs in sequencing genomics proteomics bioinformatics and imaging are generating vital information which opens a new era providing new insights of metabolic and regulatory networks as well as clues to the evolution of degradation pathways and to the molecular adaptation strategies to changing environmental conditions Functional genomic and metagenomic approaches are increasing our understanding of the relative importance of different pathways and regulatory networks to carbon flux in particular environments and for particular compounds New approaches will certainly accelerate the development of bioremediation technologies and biotransformation processes in coming years for natural attenuation of contaminated environments

Environmental Microbiology Eugene L. Madsen, 2011-08-31 This well referenced inquiry driven text presents an up to date and comprehensive understanding of the emerging field of environmental microbiology Coherent and comprehensive treatment of the dynamic emerging field of environmental microbiology Emphasis on real world habitats and selective pressures experienced by naturally occurring microorganisms Case studies and Science and the Citizen features relate issues in the public's mind to the underlying science Unique emphasis on current methodologies and strategies for conducting environmental microbiological research including methods logic and data interpretation

Handbook of Telechelic Polyesters, Polycarbonates, and Polyethers Sophie M. Guillaume, 2017-03-31 Telechelic polymers have garnered a great deal of scientific interest due to their reactive chain end functions This comprehensive book compiles and details the basic principles of and cutting edge research in telechelic polyesters polycarbonates and polyethers ranging from synthesis to applications It discusses general strategies toward telechelic polymers centered on the fundamental aspects of polycondensation reactions of cationic anionic coordination insertion and activated monomer mechanisms of the metal enzyme or otherwise organocatalyzed ring opening polymerization of cyclic monomers and of postpolymerization chemical modification methods of polymer precursors All main classes of polymers are covered separately comprising polyhydroxyalkanoates polycaprolactones polylactic acids polylactides polycarbonates and polyethers including synthetic approaches as well as some illustrative up to date examples and uses The book also addresses applications of hydroxyl thiol amino or acrylate methacrylate end capped polymers as starting materials

for the preparation of diverse polymer architectures ranging from block graft and star shaped polymers and micelles to precursors for ATRP macroinitiators polyurethane copolymers shape memory polymers or nanosized drug delivery systems The book will appeal to advanced undergraduate and graduate level students of polymer science researchers in macromolecular science especially those with an interest in functional and reactive polymers and polymer chemists in academia and industry Handbook of Biodegradable Polymers Abraham J. Domb, Joseph Kost, David Wiseman, 1998-02-04 Handbook of Biodegradable Polymers the seventh volume in the Drug Delivery and Targeting book series provides a source manual for synthetic procedures properties and applications of bioerodible polymers The authors describe widely available materials such as polyactides collagen and gelatin as well as polymers of emerging importance such as the genetically engineered and elastin based polymers which are either proprietary or in early stages of development Section 1 addresses synthetic absorbable polymers and Section 2 profiles natural semi synthetic and biosynthetic polymers Section 3 discusses the surface characterization of degradable polymers the modeling of biodegradation and non medical polymers This book is ideal for researchers from academia and industry as well as chemists pharmacists and physicians who deal with biopolymers drug delivery and targeting bioengineering and implantable devices **Bacterial Biopolymers** Bolin Kumar Konwar, 2023-09-01 Bacterial biopolymers are a competitive new area of research with potential applications in agriculture petroleum exploration and use as biodegradable plastics This new volume provides comprehensive coverage of bacterial biopolymers The book elucidates the main classes of bacterial biopolymers polysaccharides and polyesters or polyhydroxyalkanoates PHAs along with their definition classification detection extraction characterization fermentation process structure and properties applications and uses functions and more The volume covers Detection extraction and characterization of bacterial biopolymers Molecular identification of bacterial isolates The fermentation process Structure and properties of PHAs Biochemical characterization of the PHA producing bacterial strains In vitro biodegradation study of PHA film by soil microorganisms PHAs for enhancing the stability of colloidal silver nanoparticles SNP This volume is an important source of information on the concerned bacteria the biochemical characteristics of biopolymers and their potential use Fundamental Biomaterials: Metals Preetha Balakrishnan, M.S. Sreekala, Sabu Thomas, 2018-07-19 Fundamental Biomaterials Metals provides current information on the development of metals and their conversion from base materials to medical devices Chapters analyze the properties of metals and discuss a range of biomedical applications with a focus on orthopedics While the book will be of great use to researchers and professionals in the development stages of design for more appropriate target materials it will also help medical researchers understand and more effectively communicate the requirements for a specific application With the recent introduction of a number of interdisciplinary bio related undergraduate and graduate programs this book will be an appropriate reference volume for students It represents the second volume in a three volume set each of which reviews the most important and commonly used classes of biomaterials

providing comprehensive information on materials properties behavior biocompatibility and applications Provides current information on metals and their conversion from base materials to medical devices Includes analyses of types of metals discussion of a range of biomedical applications and essential information on corrosion degradation and wear and lifetime prediction of metal biomaterials Explores both theoretical and practical aspects of metals in biomaterials **The Handbook of Polyhydroxyalkanoates** Martin Koller, 2020-11-05 The third volume of the Handbook of Polyhydroxyalkanoates PHA focusses on the production of functionalized PHA bio polyesters the post synthetic modification of PHA processing and additive manufacturing of PHA development and properties of PHA based bio composites and blends the market potential of PHA and follow up materials different bulk and niche applications of PHA and the fate and use of spent PHA items Divided into fourteen chapters it describes functionalized PHA and PHA modification processing and their application including degradation of spent PHA based products and fate of these bio polyesters during compositing and other disposal strategies Aimed at graduate students and professionals in Polymer science chemical engineering and bioprocessing it Covers current state of the art in the development of chemically modifiable PHA including mult istep modifications of isolated biopolyesters short syntheses of monomer feedstocks and so forth Describes design of functionalized PHA based polymeric materials by chemical modification Illustrates preparation of bioactive oligomers derived from microbial PHA and synthetic analogues of natural PHA oligomers Discusses processing and thermomechanical properties of PHA Reviews advantages of PHA against other bio based and conventional polymers with current applications and potential uses of PHA based polymers highlighting innovative products *The Handbook of Polyhydroxyalkanoates, Three Volume Set* Martin Koller, 2020-11-05 The Handbook of Polyhydroxyalkanoates PHA focusses on and addresses varying facets of PHA biosynthesis and processing spread across three volumes The first volume discusses feedstock aspects enzymology metabolism and genetic engineering of PHA biosynthesis It addresses better understanding the mechanisms of PHA biosynthesis in scientific terms and profiting from this understanding in order to enhance PHA biosynthesis in bio technological terms and in terms of PHA microstructure It further discusses making PHA competitive for outperforming established petrol based plastics on industrial scale and obstacles for market penetration of PHA This second volume focusses on thermodynamic and mathematical considerations of PHA biosynthesis bioengineering aspects regarding bioreactor design and downstream processing for PHA recovery from microbial biomass It covers microbial mixed culture processes and includes a strong industry focused section with chapters on the economics of PHA production industrial scale PHA production from sucrose next generation industrial biotechnology approaches for PHA production based on novel robust production strains and holistic techno economic and sustainability considerations on PHA manufacturing Third volume is on the production of functionalized PHA bio polyesters the post synthetic modification of PHA processing and additive manufacturing of PHA development and properties of PHA based bio composites and blends the market potential of PHA and follow up materials different bulk and niche applications of PHA and

the fate and use of spent PHA items Divided into fourteen chapters it describes functionalized PHA and PHA modification processing and their application including degradation of spent PHA based products and fate of these bio polyesters during compositing and other disposal strategies Aimed at professionals and graduate students in Polymer plastic industry wastewater treatment plants food industry biodiesel industry this set Presents comprehensive and holistic consideration of these microbial bioplastics in the volumes Enables reader to learn about microbiological enzymatic genetic synthetic biology and metabolic aspects of PHA biosynthesis based on the latest scientific discoveries Discusses design and operate a PHA production plant Strong focus on post synthetic modification preparation of functional PHA and follow up products and PHA processing Covers all related engineering considerations

Fundamentals of Natural Fibres and Textiles Md. Ibrahim H. Mondal, 2021-03-20 The textile industry is focused in its search for alternative green fibres with the aim of providing high quality products which are fully recyclable and biodegradable Natural textile materials from renewable sources play an increasingly important role in the industry due to their unique properties and functionality over synthetic fibres as well as their sustainability *Fundamentals of Natural Fibres and Textiles* covers all the fundamental and basic information about natural fibres and textiles Many different fibres are covered from their origin through processing properties and applications The latest methods for characterisation and testing of natural fibres are all addressed with reference to cutting edge industry trends This uniquely comprehensive approach to the topic provides the ideal entry point to natural fibres for textile and clothing scientists engineers designers researchers students and manufacturers of such products Explains the characteristics of natural fibres to show how they compare to synthetic fibres for a range of purposes Provides an overview of the environmental impact of the processing of fibres and how this creates industrial waste Covers a wide range of natural fibres in detail from traditional silk and wool to electrospun biopolymers Provides the latest updates on technologies for designing natural fibres and applying them to the development of new products

Frontiers in Drug Design & Discovery Atta-ur-Rahman ,M. Iqbal Choudhary, 2017-08-01 *Frontiers in Drug Design and Discovery* is a book series devoted to publishing the latest and the most important advances in drug design and discovery Eminent scientists have contributed chapters focused on all areas of rational drug design and drug discovery including medicinal chemistry in silico drug design combinatorial chemistry high throughput screening drug targets and structure activity relationships This book series should prove to be of interest to all pharmaceutical scientists who are involved in research in drug design and discovery and who wish to keep abreast of rapid and important developments in the field

Bioprospecting of Microorganism-Based Industrial Molecules Sudhir Pratap Singh, Santosh Kumar Upadhyay, 2021-12-13 Discover a comprehensive and current overview of microbial bioprospecting written by leading voices in the field In *Bioprospecting of Microorganism Based Industrial Molecules* distinguished researchers and authors Sudhir P Singh and Santosh Kumar Upadhyay deliver global perspectives of bioprospecting of biodiversity The book covers diverse aspects of bioprospecting of microorganisms

demonstrating biomass value of nutraceutical pharmaceutical biomedical and bioenergetic importance The authors present an amalgamation of translational research on bioresource utilization and ecological sustainability that will further the reader's knowledge of the applications of different microbial diversity and reveal new avenues of research investigation Readers will also benefit from A thorough introduction to microbial biodiversity and bioprospecting An exploration of anti ageing and skin lightening microbial products and microbial production of anti cancerous biomolecules A treatment of UV protective compounds from algal biodiversity and polysaccharides from marine microalgal sources Discussions of microbial sources of insect toxic proteins and the role of microbes in bio surfactants production Perfect for academics scientists researchers graduate and post graduate students working and studying in the areas of microbiology food biotechnology industrial microbiology plant biotechnology and microbial biotechnology Bioprospecting of Microorganism Based Industrial Molecules is an indispensable guide for anyone looking for a comprehensive overview of the subject

Plastics from Bacteria George Guo-Qiang Chen, 2009-12-02 Due to the possibility that petroleum supplies will be exhausted in the next decades to come more and more attention has been paid to the production of bacterial plastics including polyhydroxyalkanoates PHA polylactic acid PLA poly butylene succinate PBS biopolyethylene PE poly trimethylene terephthalate PTT and poly p phenylene PPP These are well studied polymers containing at least one monomer synthesized via bacterial transformation Among them PHA PLA and PBS are well known for their biodegradability whereas PE PTT and PPP are probably less biodegradable or are less studied in terms of their biodegradability Over the past years their properties and applications have been studied in detail and products have been developed Physical and chemical modifications to reduce their cost or to improve their properties have been conducted PHA is the only biopolyester family completely synthesized by biological means They have been investigated by microbiologists molecular biologists biologists chemists chemical engineers polymer experts and medical researchers for many years PHA applications as bioplastics fine chemicals implant biomaterials medicines and biofuels have been developed Companies have been established for or involved in PHA related R D as well as large scale production It has become clear that PHA and its related technologies form an industrial value chain in fermentation materials feeds and energy to medical fields

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