

## Colloidal Carriers For Controlled Drug Delivery And Targeting Modification Characterization And In Vivo Distribution

Written by key experts in the field of nanomedicine, this book provides a broad introduction to the important field of nanomedicine and application of nanotechnology for drug delivery. It covers up-to-date information regarding various nanoparticulate drug delivery systems, describes the various opportunities for the application of nanoparticulate drug carriers in different areas of clinical medicine, and analyzes already available information on their clinical applications. This book can be used as an advanced textbook by graduate students and young scientists and clinicians at the early stages of their career. It is also suitable for non-experts from related areas of chemistry, biochemistry, molecular biology, biomedical engineering, physiology, experimental and clinical medicine, and pharmaceutical sciences, who are interested in general problems of drug delivery and drug targeting, as well as in more specialized topics of using nanoparticulate-mediated drug delivery approaches in the individual areas of clinical medicine. Prof Torchilin is an expert in Nanomedicine and a recipient of numerous awards including the Lenin Prize in Science & Technology of the former USSR, membership in the European Academy of Sciences, and AAPS Research Achievement Award in Pharmaceutics and Drug Delivery. He served as an Associate Professor of Radiology at Harvard Medical School before joining Northeastern University as the Chairman of the Department of Pharmaceutical Sciences. Sample Chapter(s). Chapter 1: Introduction. Nanocarriers for Drug Delivery: Needs and Requirements (442 KB). Contents: Nanoparticle Flow: Implications for Drug Delivery (A T Florence); Polymer Micelles as Drug Carriers (E V Batrakova et al.); Lipoproteins as Pharmaceutical Carriers (S Liu et al.); Dendrimers as Nanoparticulate Drug Carriers (S Svenson & D A Tomalia); Cells and Cell Ghosts as Drug Carriers (J M Lanao & M L Sayalero); Magnetic Nanoparticles as Drug Carriers (U O Hnfeli & M Chastellain); Liposomal Drug Carriers in Cancer Therapy (A A Gabizon); Delivery of Nanoparticles to the Cardiovascular System (B-A Khaw); Nanoparticles for Targeting Lymphatics (W Phillips); Nanoparticulate Carriers for Ocular Drug Delivery (A Sanchez & M J Alonso); and other papers. Readership: Graduate students, academics in nanomedicine, clinicians, pharmacologists, pharmacists, bioengineers, researchers in biotechnology and diagnostic imaging."

Polysaccharide Carriers for Drug Delivery presents the latest information on the selection of safe materials. Due to reported safety profiles on polysaccharides; they have been the natural choice for investigation. A wide variety of drug delivery and biomedical systems have been studied, however, the related information either concept-wise or application-oriented is scattered, therefore becoming difficult for readers and researchers to digest in a concise manner. This gathering of information will help readers easily comprehend the subject matter. Focuses on biopolysaccharide-based, distinct approaches for drug delivery applications Illustrates new concepts and highlights future scope for clinical development Provides comprehensive, up-to-date information on different aspects of drug delivery technology

Volume 3 of Formulation Science and Technology is a survey of the applications of formulations in a variety of fields, based on the theories presented in Volumes 1 and 2. It offers in-depth explanations and a wealth of real-world examples for research scientists, universities, and industry practitioners in the fields of Pharmaceuticals, Cosmetics and Personal Care.

Presenting breakthrough research pertinent to scientists in a wide range of disciplines-from medicine and biotechnology to cosmetics and pharmacy-this Second Edition provides practical approaches to complex formulation problems encountered in the development of particulate delivery systems at the micro- and nano-size level. Completely revised and e

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This practical guide offers concise coverage of the scientific and pharmaceutical aspects of protein delivery from controlled release microparticulate systems-emphasizing protein stability during encapsulation and release.

Modeling and Control of Drug Delivery Systems provides comprehensive coverage of various drug delivery and targeting systems and their state-of-the-art related works, ranging from theory to real-world deployment and future perspectives. Various drug delivery and targeting systems have been developed to minimize drug degradation and adverse effect and increase drug bioavailability. Site-specific drug delivery may be either an active and/or passive process. Improving delivery techniques that minimize toxicity and increase efficacy offer significant potential benefits to patients and open up new markets for pharmaceutical companies. This book will attract many researchers working in DDS field as it provides an essential source of information for pharmaceutical scientists and pharmacologists working in academia as well as in the industry. In addition, it has useful information for pharmaceutical physicians and scientists in many disciplines involved in developing DDS, such as chemical engineering, biomedical engineering, protein engineering, gene therapy. Presents some of the latest innovations of approaches to DDS from dynamic controlled drug delivery, modeling, system analysis, optimization, control and monitoring Provides a unique, recent and comprehensive reference on DDS with the focus on cutting-edge technologies and the latest research trends in the area Covers the most recent works, in particular, the challenging areas related to modeling and control techniques applied to DDS

This contribution book collects reviews and original articles from eminent experts working in the interdisciplinary arena of novel drug delivery systems and their uses. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of different smart drug delivery systems. Since the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. On the other hand, this reference discusses advances in the design, optimization, and adaptation of gene delivery systems for the treatment of cancer, cardiovascular, diabetic, genetic, and infectious diseases, and considers assessment and review procedures involved in the development of gene-based pharmaceuticals.

This book combines emulsion knowledge into a single, comprehensive volume, ideal for professionals and students involved in the areas of pharmaceutical science who are looking to learn about this emergent research concept. Compiles the step-by-step investigations made concerning the potential of nanosized emulsions on both drug delivery and drug targeting areas by different group of scientists in various laboratories across the world Inverts the common nano-emulsions coverage trend of focusing on focused on the particulate system itself, instead exploring the way to turn nanosized emulsions as biomedical tool, as well as, treating the in vitro and in vivo aspects after administration Provides an overview of the current state-of-the art regarding the development of tocol emulsions, emulsion adjuvants in immunization research, oxygen-carrying emulsions (called as fluorocarbon emulsion) and emulsions for delivering drugs to nasal and topical (ocular and transdermal) routes

?What are lipid nanoparticles? How are they structured? How are they formed? What techniques are best to characterize them? How great is their potential as drug delivery systems? These questions and more are answered in this comprehensive and highly readable work on lipid nanoparticles. This work sets out to provide the reader with a clear and understandable understanding of the current practices in formulation, characterization and drug delivery of lipid nanoparticles. A comprehensive description of the current understanding of synthesis, characterization, stability optimization and drug incorporation of solid lipid nanoparticles is provided. Nanoparticles have attracted great interest over the past few decades with almost exponential growth in their research and application. Their small particle size and subsequent

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high surface area make them ideal in many uses, but particularly as drug carrier systems. Nanoparticles made from lipids are especially attractive because of their enhanced biocompatibility imparted by the lipid. The work provides a detailed description of the types of lipid nanoparticles available (e.g. SLN, NLC, LDC, PLN) and how they range from imperfect crystalline to amorphous in structure. Current thoughts on where drugs are situated (e.g. in the core, or at the interface) and how this can be manipulated are discussed. The many techniques for production, including the author's own variant of microwave heating, are fully discussed. Techniques for measuring arguably the most important characteristics of particle size and polydispersity are discussed, along with techniques to measure crystallinity, shape and drug capacity. Finally, a full chapter on techniques for measuring stability, both in the absence and presence of drugs, is discussed, along with suggestions on how to optimize that stability. This work appeals to students of colloid science, practitioners of research into drug delivery and academics alike.

**Microsized and Nanosized Carriers for Nonsteroidal Anti-Inflammatory Drugs: Formulation Challenges and Potential Benefits** provides a unique and complete overview of novel formulation strategies for improvement of the delivery of NSAIDs via encapsulation in microsized and nanosized carriers composed of different materials of natural and synthetic origin. This book presents the latest research on advances and limitations of both microsized and nanosized drug carriers and NSAIDs before discussing the formulation aspects of these drug carriers that are intended for oral, dermal, and transdermal administration of NSAIDs. In addition, functionality of these materials as potential excipients for microsized and nanosized carriers is discussed and debated. Practical solutions for improving effectiveness of these drugs are included throughout the book, making this an important resource for graduate students, professors, and researchers in the pharmaceutical sciences. Covers a wide range of microsized and nanosized carriers in one resource, including particulate carriers (microparticles, nanoparticles, and zeolites) and the soft colloidal carriers, such as micro-emulsions and nano-emulsions Presents the reader with various formulation approaches dependent on the characteristics of the material, model drug, and desired route of administration Approaches are based on the latest research in the area and formulation strategies may have broader applications to the encapsulation of other active pharmaceutical ingredients

This volume provides a single-source of reviews for all the important colloidal drug delivery systems, including nanoparticles, liposomes, niosomes, microemulsions and ointments. Over 1000 bibliographic citations, as well as tables, drawings, equations and photographs, are provided. Arranged in order of increasing physical complexity, this work ana

The increased understanding of molecular aspects associated with chronic diseases, such as cancer and the role of tumor microenvironment, has led to the identification of endogenous and exogenous stimuli that can be exploited to devise "stimuli-responsive" materials for site-specific drug delivery applications. This book provides a comprehensive account on the design, materials chemistry, and application aspects behind these novel stimuli-responsive materials. Setting the scene, the editors open with a chapter addressing the need for smart materials in delivery applications for therapy, imaging and disease diagnosis. The following chapter describes the key physical and chemical aspects of smart materials, from lipids to polymers to hybrid materials, providing the reader with a springboard to delve into the more application oriented chapters that follow. With in-depth coverage of key drug delivery systems such as pH-responsive, temperature responsive, enzyme-responsive and light responsive systems, this book provides a rigorous foundation to the field. A perfect resource for graduate students and newcomers, the closing chapter on regulatory and commercialization challenges also makes the book ideal for those wanting to take the next step towards clinical translation.

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Colloidal drug delivery systems present a range of therapeutic benefits in the treatment of a number of challenging conditions, allowing researchers to cross barriers that have previously prevented efficient treatment while offering improved and more targeted absorption.

Summarizing recent research in the field, *Colloids in Drug Delivery* assembles

A promising strategy to overcome these problems involves the development of suitable drug carrier system. The In vivo fate of the drug is no longer mainly determined by the properties of the drug, but by the carrier system, which permit a controlled and localized release of the active drug according to the specific needs of the therapy. The size of the carrier depends on the desired route of administration and ranges from few nanometers to micrometers (implants). Implants and microparticles are too large for drug targeting and intravenous administration.

Therefore, colloidal carriers have attracted increasing attention during recent years. Investigated systems include nanoparticles, nanoemulsions, liposomes, niosomes, nanosuspensions, micelles, and soluble polymer-drug conjugates.

This contribution book collects reviews and original articles from eminent experts working in the interdisciplinary arena of novel drug delivery systems and their uses. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of different drug delivery systems. Since the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. On the other hand, this reference discusses advances in the design, optimization, and adaptation of gene delivery systems for the treatment of cancer, cardiovascular, pulmonary, genetic, and infectious diseases, and considers assessment and review procedures involved in the development of gene-based pharmaceuticals.

*Drug Targeting and Stimuli Sensitive Drug Delivery Systems* covers recent advances in the area of stimuli sensitive drug delivery systems, providing an up-to-date overview of the physical, chemical, biological and multistimuli-responsive nanosystems. In addition, the book presents an analysis of clinical status for different types of nanoplatforms. Written by an internationally diverse group of researchers, it is an important reference resource for both biomaterials scientists and those working in the pharmaceutical industry who are looking to help create more effective drug delivery systems. Shows how the use of nanomaterials can help target a drug to specific tissues and cells Explores the development of stimuli-responsive drug delivery systems Includes case studies to showcase how stimuli responsive nanosystems are used in a variety of therapies, including camptothecin delivery, diabetes and cancer therapy

While simultaneous breakthroughs occurring in molecular biology and nanoscience/technology will ultimately revolutionize all of medicine, it is with our efforts to prevent, diagnose, and treat cancer that many of the most dramatic advances will occur. In support of this potential, the U.S. National Cancer Institute (NCI) established the Alliance fo

. Despite their capacity to carry out functions that previously were unobtainable, smart polymers and hydrogels tend to have painfully slow response times. On the other hand biological systems go through phase changes at an extremely fast rate. *Reflexive Polymers and Hydrogels* examines the natural systems that respond almost instantaneously to envi

*Colloid and Interface Science in Pharmaceutical Research and Development* describes the role of colloid and surface chemistry in the pharmaceutical sciences. It gives a detailed account of colloid theory, and explains physicochemical properties of the colloidal-pharmaceutical systems, and the methods for their measurement. The book starts with fundamentals in Part I, covering fundamental aspects of colloid and interface sciences as applied to pharmaceutical sciences and thus should be suitable for teaching. Parts II and III treat applications and measurements, and they explains the application of these properties and their influence and use for the development of new

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drugs. Provides a clear description of the fundamentals of colloid and interface science relevant to drug research and development Explains the physicochemical/colloidal basis of pharmaceutical science Lists modern experimental characterization techniques, provides analytical equations and explanations on analyzing the experimental data Describes the most advanced techniques, AFM (Atomic Force Microscopy), SFA (Surface Force Apparatus) in detail

Lipid Nanocarriers for Drug Targeting presents recent advances in the area of lipid nanocarriers. The book focuses on cationic lipid nanocarriers, solid lipid nanocarriers, liposomes, thermosensitive vesicles, and cubosomes, with applications in phototherapy, cosmetic and others. As the first book related to lipid nanocarriers and their direct implication in pharmaceutical nanotechnology, this important reference resource is ideal for biomaterials scientists and those working in the medical and pharmaceutical industries that want to learn more on how lipids can be used to create more effective drug delivery systems. Highlights the most commonly used types of lipid nanocarriers and explains how they are applied in pharmacy Shows how lipid nanocarriers are used in different types of treatment, including oral medicine, skin repair and cancer treatment Assesses the pros and cons of using different lipid nanocarriers for different therapies

Poly(lactic-co-glycolic acid) (PLGA) is one of the most successful polymers used for producing therapeutic devices, such as drug carriers (DC). PLGA is one of the few polymers that the Food and Drug Administration (FDA) has approved for human administration due to its biocompatibility and biodegradability. In recent years, DC produced with PLGA has gained enormous attention for its versatility in transporting different type of drugs, e.g., hydrophilic or hydrophobic small molecules, or macromolecules with a controlled drug release without modifying the physicochemical properties of the drugs. These drug delivery systems have the possibility/potential to modify their surface properties with functional groups, peptides, or other coatings to improve the interactions with biological materials. Furthermore, they present the possibility to be conjugated with specific target molecules to reach specific tissues or cells. They are also used for different therapeutic applications, such as in vaccinations, cancer treatment, neurological disorder treatment, and as anti-inflammatory agents. This book aims to focus on the recent progress of PLGA as a drug carrier and their new pharmaceutical applications.

This consolidated reference book addresses the various aspects of nano biomaterials used in ophthalmic drug delivery, including their characterization, interactions with ophthalmic system and applications in treatments of the ophthalmic diseases and disorders. In the last decade, a significant growth in polymer sciences, nanotechnology and biotechnology has resulted in the development of new nano- and bioengineered nano-bio-materials. These are extensively explored as drug delivery carriers as well as for implantable devices and scaffolds. At the interface between nanomaterials and biological systems, the organic and synthetic worlds merge into a new science concerned with the safe use of nanotechnology and nano material design for biological applications. For this field to evolve, there is a need to understand the dynamic forces and molecular components that shape these interactions. While it is impossible to describe with certainty all the bio physicochemical interactions at play at the interface, we are at a point where the pockets of assembled knowledge are providing a conceptual framework to guide this exploration, and review the impact on future product development. The book is intended as a valuable resource for academics and pharmaceutical scientists working in the field of polymers, polymers materials for drug delivery, drug delivery systems and ophthalmic drug delivery systems, in addition to medical and health care professionals in these areas.

This book presents a multidisciplinary assessment of the state of science in the use of systemic delivery technologies to deliver anti-aging therapeutics now under development. There is a gap between basic aging research and the development of intervention technologies. This major obstacle must be overcome before biogerontological interventions can be put into clinical practice. As biogerontology comes to

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understand aging as a systemic degenerative process, it is clear that there is a pressing need for technologies that enable cells and tissues in a fully developed adult body to be manipulated systemically to combat aging. The authors review advances in the chemistry and engineering of systemic delivery methods and analyze the strengths and limitations of each. The book is organized into six sections. The first offers an overview of the need for systemic delivery technologies alongside the development of anti-aging therapies and describes approaches that will be required for studying the properties and efficiency of carriers for systemic delivery. Sections II, III and IV describe recent advances in a range of strategies that may enable systemic delivery to help combat aging conditions ranging from cell senescence to decline in immune function and hormonal secretion. Section V discusses practical strategies to engineer and optimize the performance of delivery technologies for applications in systemic delivery, along with their working principles. The final section discusses technical and biological barriers that must be overcome as systemic delivery technologies move from research laboratory to clinical applications aimed at tackling aging and age-associated diseases. Benefiting scholars, students and a broader audience of interested readers, the book includes helpful glossary sections in each chapter, as well as sidebars that highlight important notes, and questions for future research.

This volume contains selected papers presented at the 42nd Biennial Meeting of the Kolloid-Gesellschaft held at the RWTH Aachen University September 26-28, 2005. The contributions in this volume represent the diversity of research topics in colloid and polymer science. They include the investigation of synthesis and properties of advanced temperature sensitive particles and their biomedical applications, drug delivery systems, foams, capsules, vesicles and gels, polyelectrolytes, nanoparticles surfactants and hybrid materials.

This book collects reviews and original articles from eminent experts working in the interdisciplinary arena of nanotechnology use in drug delivery. From their direct and recent experience, the readers can achieve a wide vision on the new and ongoing potentialities of nanotechnology application of drug delivery. Since the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. On the other hand, this reference discusses advances in design, optimization, and adaptation of gene delivery systems for the treatment of cancer, cardiovascular, pulmonary, genetic, and infectious diseases, and considers assessment and review procedures involved in the development of gene-based pharmaceuticals.

Polymeric Surfactants covers the structure and stability origins of these highly useful surfactants. Adsorption and solution properties in emulsions are discussed based on their underlying thermodynamics and kinetics. Research scientists and Ph.D. students investigating chemistry, chemical engineering and colloidal science will benefit from this text on polymeric surfactants and their value in preparation and stabilization of disperse systems.

Phytopharmaceuticals and Drug Delivery Approaches. Editors: Ramyadevi and BN Vedha Hari

It is anticipated that submicron emulsion and lipid suspension will find numerous and novel medical applications in the near future. The purpose of this multi-authored book is to provide the reader with an up-to-date general overview of submicron emulsions and lipid suspensions (solid lipid nanoparticles) as well as to emphasize the various methods of preparation, characterization, evaluation and potential applications in various therapeutic areas. Leading authors have contributed to this unique book which contains all state of the art and detailed knowledge related to the physico-chemical, pharmaceutical and medical aspects of these

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most interesting but complex dosage forms, thus making this information easily available to the reader. This book will be of interest to scientists working in the field of drug delivery and targeting in universities as well as in the pharmaceutical, food, cosmetic, veterinary and chemical industries.

Volume 3 of the Handbook of Colloid and Interface Science is a survey into the applications of colloids in a variety of fields, based on theories presented in Volumes 1 and 2. The Handbook provides a complete understanding of how colloids and interfaces can be applied in materials science, chemical engineering, and colloidal science. It is ideally suited as reference work for research scientists, universities, and industries.

Emphasizing four major classes of polymers for drug delivery-water-soluble polymers, hydrogels, biodegradable polymers, and polymer assemblies-this reference surveys efforts to adapt, modify, and tailor polymers for challenging molecules such as poorly water-soluble compounds, peptides/proteins, and plasmid DNA.

The aim of this book is to provide an analysis of the main characteristics and applications of hydrogels. Hydrogels are frequently used for manufacturing contact lenses, hygiene products, tissue engineering scaffolds, drug delivery systems, and wound dressings. These materials are useful in everyday life, so publicizing them in both academic and pharmaceutical fields is essential. One of the most promising strategies to improve the bioavailability of active pharmaceutical ingredients is based on the association of the drug with colloidal carriers, for example, polymeric nanoparticles, which are stable in biological environment, protective for encapsulated substances and able to modulate physicochemical characteristics, drug release and biological behaviour. The synthetic polymers possess unique properties due to their chemical structure. Some of them are characterized with mucoadhesiveness; another can facilitate the penetration through mucous layers; or to be stimuli responsive, providing controlled drug release at the target organ, tissues or cells; and all of them are biocompatible and versatile. These are suitable vehicles of nucleic acids, oligonucleotides, DNA, peptides and proteins. This chapter aims to look at the 'hot spots' in the design of synthetic polymer nanoparticles as an intelligent drug delivery system in terms of biopharmaceutical challenges and in relation to the route of their administration: the non-invasive-oral, transdermal, transmucosal (nasal, buccal/sublingual, vaginal, rectal and ocular) and inhalation routes-and the invasive parenteral route.

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Colloidal carriers (particles, emulsions) for intravenous administration are a promising approach to achieve controlled release and site-specific delivery of drugs. The success of the systems will depend on their ability to maintain in blood circulation (controlled release system) or to reach target cells (e.g., bone marrow, blood cells). It is well known that the surface properties of i.v. injected particles are important factors determining the organ distribution and fate in vivo.

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Controlled surface modification could therefore be used to direct the carriers to the desired tissues. This book deals with the physico-chemical characterization of colloidal drug delivery systems and the influence of these parameters upon in vitro cell uptake and in vivo tissue distribution. Within the book, several different methods and their effect on surface characterization are discussed, and the in vivo tissue distribution of nanoparticles different in size and surface properties (coatings with Poloxamer/Polaximine/ethoxylated nonylphenols) and the carrier properties are examined in detail. The book does not deal with single aspects, but offers a comprehensive treatment of the subject. As a result, the book contributes to a better understanding of the factors influencing the organ distribution of i.v. drug carriers and provides useful information for the rational design of new carriers. It succeeds in clearing the way for future developments and the optimization of carriers for controlled drug delivery.

Design of Nanostructures for Versatile Therapeutic Applications focuses on antimicrobial, antioxidant and nutraceutical applications of nanostructured materials. Many books discuss these subjects, but not from a pharmaceutical point-of-view. This book covers novel approaches related to the modulation of microbial biofilms, antimicrobial therapy and encapsulate polyphenols as antioxidants. Written by an internationally diverse group of academics, this book is an important reference resource for researchers, both in biomaterials science and the pharmaceutical industry. Assesses the most recently developed nanostructures that have potential antimicrobial properties, explaining their novel mechanical aspects Shows how nanoantibiotics can be used to more effectively treat disease Provides a cogent summary of recent developments in nanoantimicrobial discovery, allowing readers to quickly familiarize themselves with the topic

With the advent of analytical techniques and capabilities to measure particle sizes in nanometer ranges, there has been tremendous interest in the use of nanoparticles for more efficient methods of drug delivery. Nanoparticulate Drug Delivery Systems addresses the scientific methodologies, formulation, processing, applications, recent trends, and e  
Published in 1998: Electronically Controlled Drug delivery provides an overview of advances in drug delivery using electronics to regulate the delivery profile and optimize therapy.

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