Electrospinning Method To Produce Drug Loaded Nanofibers

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for Controlled Released and Target Delivery

RICE MADDEN

Electrospun Nanofibers from Bioresources for High-Performance Applications Elsevier
This volume deals with the various fabrication techniques, surface functionalization and biomedical applications of polymeric fibers possessing different scale and structure. It provides an overview of fabrication techniques such as Co-axial, Centrifugal, Melt and Yarning to procure multiscale, tubular and layered fibrous scaffold employed for biomedical applications. The chapters in this volume discusse the surface/chemical functionalization of fibers which enhance the biological properties of the fibrous scaffolds as well as the development of hybrid, layered and external stimuli-responsive fibrous scaffolds that hold potential application in biosensor and other biomedical fields. In addition, recent advances and applications of polymeric multiscale fibers in tissue engineering, regenerative medicine and drug delivery are presented. The potential use of fibrous scaffolds in bone, neural, tendon/ligament and cardiac tissue engineering, nanofibers as an antimicrobial wound dressing, employed in cancer theragnostics and in the treatment of skin/periodontal infections are discussed. The volume provides expert knowledge on the fabrication techniques, development of different scale and hybrid structure fibers, surface functionalization, layered and external stimuli responsive fibrous scaffolds. It will be beneficial to material/biomaterials scientists, bioengineering and biotechnologists by providing a better understanding on the subject of the innovative applications of fibrous scaffolds in drug delivery, tissue engineering, wound dressings and regenerative medicine.
Electrospun Polymer Nanofibers for Food and Health Applications John Wiley & Sons
Medical Textiles from Natural Resources provides systematic and comprehensive coverage of the fundamentals, production methods, processing techniques, characterization techniques, properties and applications of medical textile materials from natural resources. Medical textiles offer a variety of technical and functional properties valued in medical and healthcare sectors, often relating to hygiene. As medical textile products remain in close contact with the human body, the fibre must have characteristics such as biological compatibility, biological degradability, permeability and nontoxicity. Only materials from natural renewable sources have such characteristics. This book provides the latest information on a wide range of medical applications, from single suture and wound dressings, to implants and tissue scaffolds. It also offers a systematic review of the manufacture, properties and applications of technical textiles for medical use. Explains the latest technologies related to fibre extraction from natural sources, chemical treatments, weave constructions, fabric

finishes and coatings. Describes innovative applications of nanomaterials in the treatment of textile fabric and the utilization of carbohydrate polymers in the preparation of nanoparticles deposited in nonwoven fabrics. Helps product designers to find appropriate materials from natural resources with the characteristics of biodegradability, renewability, biocompatibility and nontoxicity.

Electrospinning and Electrospraying Electrospinning Method Used to Create Functional Nanocomposites Films Fiber and Textile Engineering in Drug Delivery Systems explains how innovative textile processing methods including rotary spinning, microfluidics, wet spinning and electrospinning can be used to produce novel drug delivery solutions. This topical book provides detailed descriptions of how to produce such new materials for this purpose, with foundational content to help readers from a range of backgrounds understand the context of material selection and design decisions. Emphasis is given to the engineering side of the manufacturing of the textile and its role in drug delivery, but this also acts as a guide to pharmaceutical applications of textile fibers for materials scientists. Drug delivery research is rapidly expanding and experimenting with new materials to drive improved clinical outcomes as the efficacy of the therapeutic molecule is highly dependent on the right choice of carrier system. Recently, fiber based carriers at both nano and micro scales are gaining interest in the scientific community due to ease of manufacturing, high surface area to volume ratio, desirable drug release kinetics and high mechanical strength. Describes methods for material selection and design for drug delivery systems Provides case studies to explain how these techniques can be applied successfully Covers the regulatory and legal aspects of the use of the textiles and fibers in drug delivery

Nanofibres in Drug Delivery BoD – Books on Demand This book is a supplement of the previous book Nanofibers: Production, Properties and Functional Applications (published by InTech in 2011). It reports on novel methods of fabricating nanofibers, nanofiber yarns, and collagen nanofibers; functionalities of photochromic nanofibers, bead-on-string nanofibers, and bio-regeneration nanofibers; as well as piezoelectric nanoparticle-reinforced nanofibers. I deeply appreciate the authors' great contributions to nanofiber discipline.

Functionalized Nanofibers CRC Press APPLICATIONS OF POLYMER NANOFIBERS Explore a comprehensive review of the practical experimental and technological details of polymer nanofibers with a leading new resource Applications of Polymer Nanofibers delivers a complete introduction to the basic science of polymer nanofibers as well as a review of their diverse applications. The book assesses their potential for commercialization and presents contributions from leading experts emphasizing their practical and technological details. New and up to date research findings are presented throughout the book in areas including filters,

fabric, energy, fuel cells, batteries, sensors, biomedicine, drug delivery, tissue engineering, and wound dressings. The book also presents a fulsome analysis of the technology of electrospinning, the most convenient and scalable technique for nanofiber production. It also provides readers with practical information on relevant surface modification techniques. Applications of Polymer Nanofibers effectively balances theoretical background with practical applications of the technology, including insights into polymer nanofiber materials that will be useful for advanced students and researchers. Students, researchers, and industry professionals will also enjoy the inclusion of: A thorough introduction to electrospinning parameters and resulting nanofiber characteristics, including theoretical and practical considerations An exploration of textile applications of nanofibers, like protective clothing, filter fabrics, wearable devices, functional fabrics, and biomedical textiles A review of nanofiber mats as high-efficiency filters, including filtration developments, filters made with nanofibers, and the future outlook for nanofiber filters A treatment of nanofiber-based chemical sensors, including sensor materials, approaches to nanofiber sensor design, and gravimetric nanofiber sensors Perfect for researchers and graduate students studying polymer science and engineering, chemical engineering, materials science, and nanotechnology. Applications of Polymer Nanofibers will also earn a place in the libraries of industrial researchers concerned with electrospinning, air filtration, fabrics, drug delivery, catalysis, and biomedicine.

Electrospinning BoD – Books on Demand

Presenting the latest coverage of the fundamentals and applications of nanofibrous materials and their structures for graduate students and researchers, this book bridges the communication gap between fiber technologists and materials scientists and engineers. Featuring intensive coverage of electroactive, bioactive and structural nanofibers, it provides a comprehensive collection of processing conditions for electrospinning and includes recent advances in nanoparticle-/nanotube-based nanofibers. The book also covers mechanical properties of fibers and fibrous assemblies, as well as characterization methods.

Electrospinning Method Used to Create Functional Nanocomposites Films

CRC Press

This book focuses on the recent advancements in the process parameters, research, and applications of electrospinning and electrospraying. The first chapter introduces the techniques and the effect of the parameters on the morphology of the nanofiber and nanoparticles and then the subsequent chapters focus on the applications of these techniques in different areas. This book will attract a broad audience including postgraduate students and industrial and academic investigators in sciences and engineering who wish to enhance their understanding of the emerging technologies and use this book as reference.

Electrospun Nanofibers

Cambridge University Press

In recent years there has been an explosion of interest in the production of nanoscale fibres for drug delivery and tissue engineering. Nanofibres in Drug Delivery aims to outline to new researchers in the field the utility of nanofibres in drug delivery, and to explain to them how to prepare fibres in the laboratory. The book begins with a brief discussion of the main concepts in pharmaceutical science. The authors then introduce the key techniques that can be used for fibre production and explain briefly the theory behind them. They discuss the experimental implementation of fibre production, starting with the simplest possible set-up and then moving on to consider more complex arrangements. As they do so, they offer advice from their own experience of fibre production, and use examples from current literature to show how each particular type of fibre can be applied to drug delivery. They also consider how fibre production could be moved beyond the research laboratory into industry, discussing regulatory and scale-up aspects.

Synthesis and Applications of Electrospun Nanofibers Woodhead Publishing
This book describes a broad area of nanomedicine which involves mainly applications, diseases, and diagnostics. The comprehensive coverage provides researchers, academics, and health specialists with a great tool, that includes techniques applicable to various uses.
Electrospun Polymeric Nanofibers CRC Press
Nanofibers are possible solutions for a wide spectrum of research and commercial applications and utilizing inexpensive bio-renewable and agro waste materials to produce nanofibers can lower manufacturing cost via electrospinning. This book explains synthesis of green, biodegradable, and environmentally friendly nanofibers from bioresources, their mechanical and morphological characteristics along with their applications across varied areas. It gives an elaborate idea on conductive polymers for tissue engineering application as well. Features: Provides insight about electrospun nanofibers from green, biodegradable and environmentally friendly bio resources. Reviews surface characterization of electrospun fibers. Covers diversified applications such as cancer treatment, COVID-19 solutions, food packaging applications, textile materials, and flexible electronic devices. Describes the combined use of 3D printing and electrospinning for tissue engineering scaffolds. Includes Melt electrospinning technique and its advantages over Solution electrospinning This book aims at Researchers and Graduate Students in Material Science and Engineering, Environmental Engineering, Chemical Engineering, Electrical Engineering, Mechanical Engineering, and Biomedical Engineering.
Handbook of Nanofibers and Nanocomposites World Scientific
The design and study of materials is a pivotal component to new discoveries in the various fields of science and technology. By better understanding the components and structures of materials, researchers can increase its applications across

different industries. Materials Science and Engineering: Concepts, Methodologies, Tools, and Applications is a compendium of the latest academic material on investigations, technologies, and techniques pertaining to analyzing the synthesis and design of new materials. Through its broad and extensive coverage on a variety of crucial topics, such as nanomaterials, biomaterials, and relevant computational methods, this multi-volume work is an essential reference source for engineers, academics, researchers, students, professionals, and practitioners seeking innovative perspectives in the field of materials science and engineering.
Novel Aspects of Nanofibers Royal Society of Chemistry
The research and development of nanofibers has gained much prominence in recent years due to the heightened awareness of its potential applications in the medical, engineering and defense fields. Among the most successful methods for producing nanofibers is the electrospinning process. In this timely book, the areas of electrospinning and nanofibers are covered for the first time in a single volume. The book can be broadly divided into two parts: the first comprises descriptions of the electrospinning process and modeling to obtain nanofibers while the second describes the characteristics and applications of nanofibers. The material is aimed at both newcomers and experienced researchers in the area.
Applications of Polymer Nanofibers BoD – Books on Demand
Functionalized Nanofibers: Synthesis and Industrial Applications presents the latest advances in the fabrication, design, processing, and properties of functionalized nanofibers for a range of advanced applications. Sections introduce fabrication, mechanisms, and design of functionalized nanofibers, explaining electrospinning and non-electrospinning techniques, optimization of structural designs, surface functionalization techniques, and characterization methods. Subsequent sections focus on specific application areas, highlighting preparation methods and applications of functionalized nanofibers across biomedicine, surfaces and coatings, food, environment, energy, electronics, and textiles. Finally, environmental impact and safety and legal aspects related to the utilization of functionalized nanofibers are considered. This is a valuable resource for researchers and advanced students with an interest in nanomaterials and nanotechnology, and across other disciplines such as polymer science, chemistry, chemical engineering, and materials science and engineering. Integrates discussions of physics, chemistry, biology and materials science behind functionalized nanofibers Opens the door to a range of applications across biomedicine, surfaces and coatings, food, environment, energy, electronics and textiles Analyzes challenges and opportunities relating to environmental, health and safety issues
Electrospun Nanofibres Elsevier
Textiles with functional properties such as antimicrobial finishes, drug delivery, ultraviolet resistance, electrical conductivity, superhydrophilicity,

superhydrophobicity, self-cleaning, EMI shielding, flame-retardance can be developed with the help of nanotechnology. Nanomaterials can be added to the textile materials at different stages of the production process, including spinning, finishing, and coating. Nanofibers are textile fibers that show enhanced properties due to larger surface area compared with ordinary textile fibers. They have diameters less than 1000 nm and can hold nanoparticles, drugs, extracts, essential oils, etc. in their polymeric matrix. They actually encapsulate these compounds and are able to control their release by delivering them only at the targeted sites. Recently, nanofibers and textile nanocomposites have attracted great interest in the industry and research, and electrospinning is the most famous among the several methods that have been developed for the fabrication of nanofibers. This book is a collection of the reviews on the recent advances in the fields of nanofibers, nanocomposites, and their applications in textiles as well as related fields.

Electrospun and Nanofibrous Membranes John Wiley & Sons

Increased interest in nanotechnology has revived a fiber processing technique invented back in the 1930's. Electrospinning produces nanometer to micron size fibers that are not otherwise achievable using conventional fiber spinning methods. Due to small fiber diameters, high surface area, tailorable surface morphology, and the creation of an interconnected fibrous network, electrospun fibers have found use in a variety of applications. However, a multitude of parameters directly affect the electrospinning process thus requiring a fundamental understanding of how various parameters affect the process and resulting fiber properties. Accordingly, the focus of this dissertation is to provide insight on how solution characteristics and processing parameters directly affect the electrospinning process, and then apply this knowledge to create electrospun membranes for biomedical applications. These fundamental studies provided insight on how to control the electrospinning process; this knowledge was then utilized to electrospin fibrous membranes for biomedical applications. One aspect of this work focused on incorporating low molecular weight heparin (LMWH) into electrospun fibers. Heparin is known for its ability to bind growth factors and thus it plays an integral role in drug delivery and tissue engineering applications. The goal of this work was to fabricate functionalized electrospun fibers to produce a biologically active matrix that would allow for the binding and delivery of growth factors for possible drug delivery applications. The electrospinning process was also utilized to fabricate native polymers such as collagen and gelatin into fiber form. The collagen and gelatin fibers were 2--6 & mu;m in diameter and required crosslinking to stabilize the fibers. Crosslinking and sterilization protocols were investigated to optimize the conditions needed to produce collagen and gelatin electrospun membranes to be used in bone regeneration applications. (Abstract shortened by UMI.).

An Introduction to Electrospinning and Nanofibers Woodhead Publishing
The aim of this book is to explore the history, fundamentals, manufacturing processes, optimization parameters, and applications of electrospun materials. The book includes various types of electrospun materials such as antimicrobial, smart, bioinspired systems. It focuses on the many application areas for electrospun materials such as energy storage and harvesting, catalysis, biomedical including gene delivery and tissue engineering, separation, adsorption and water treatment technologies, packaging. The book emphasizes the enhanced sustainable properties of electrospun materials, with the challenges and future developments being discussed in detail. The chapters are written by top-class researchers and experts from throughout the world.
Electrospun Polymer Nanofibers for Food and Health Applications MDPI
Electrospinning is from the academic as well as technical perspective presently the most versatile technique for the preparation of continuous nanofi bers obtained from numerous materials including polymers, metals, and ceramics. Shapes and properties of fibers can be tailored according to the demand of numerous applications including filtration, membranes, textiles, catalysis, reinforcement, or biomedicals. This book summarizes the state-of-the art in electrospinning with detailed coverage of the various techniques, material systems and their resulting fiber structures and properties, theoretical aspects and applications. Throughout the book, the current status of knowledge is introduced with a critical view on accomplishments and novel perspectives. An experimental section gives hands-on guidance to beginners and experts alike.
Recent Development of Electrospinning for Drug Delivery World Scientific
Electrospinning Method Used to Create Functional Nanocomposites FilmsBoD – Books on Demand
Introduction to Nanofiber Materials Elsevier
The purpose of the research is to develop a novel type of drug delivery carrier with the capability of encapsulating multiple drugs and release the drugs in controlled manner. Nanotechnology as a delivery platform offers very promising applications in drug delivery. Polymeric drug delivery devices were successfully developed via electrospinning technique using PCL, PLLA and PLLA-CL biodegradable polymers. Coaxial electrospinning configurations was used to encapsulate three proteins which are BSA, lysozyme and IgG into the electrospun nanofibers. Using the configuration, two separate polymers solutions flowed through two different capillaries which are coaxial with a smaller capillary inside a larger capillary. A number of processing parameters were investigated during the electrospinning process which are formulation of drug loading, the type of polymer and drug and the concentration of polymer and drug. The morphology of the electrospun nanofibers was analyzed using Scanning Electron Microscopy (SEM). The mechanical property was analyzed by using tensile strength and UVSpectrophotometer was used to study the proteins release profile. The results showed that

the incorporated proteins could be controlled release by adjusting the process parameters and the proteins structure and bioactivity are maintained. Polymeric drug delivery device is able deliver a pre-determined amount of drug over specific amount of time in a predictable manner. It can improve the effectiveness of drug therapy by increasing the therapeutic activity and reducing the number of drug administrations. *Droplet-jet Shape in Electrospinning* CRC Press The fact that different plants grow in each climate type, that each plant has different and many benefits, and that it can obtain bio-structured, sustainable, economic, and ecological products has increased the work of researchers in this field. The long-term toxicity and harmful side effects of herbal extracts are generally less compared to synthetic drugs. Studies on the production of nanofibrous membrane structures from plant extracts are relatively limited and are an emerging field. Herbal extracts have a positive effect in electrospinning applications with their biodiversity, ability to maintain biological functionality, and wound healing effects against pathogenic microorganisms. With the creation of nanofiber structures of plants obtained from natural sources, applications in fields such as wound healing, tissue engineering, drug release are increasing day by day.