

Zhenyu Li · Ce Wang

# One-Dimensional Nanostructures Electrospinning Technique and Unique Nanofibers

# One Dimensional Nanostructures Electrospinning Technique And Unique Nanofibers Springerbriefs In Materials

**Yanbo Liu,Ce Wang**



## **One Dimensional Nanostructures Electrospinning Technique And Unique Nanofibers Springerbriefs In Materials:**

**One-Dimensional nanostructures** Zhenyu Li,Ce Wang,2013-03-21 One Dimensional Nanostructures Electrospinning Technique and Unique Nanofibers is a comprehensive book depicting the electrospinning technique and related 1D unique electrospun nanofibers The first part of the book focuses on electrospinning technique with chapters describing Electrospinning setup electrospinning theories and related working parameter The second part of the book describes in detail specific topics on how to control the electrospun fiber properties such as how to control the fiber direction how to control the fiber surface morphology how to control the fiber structure and how to construct 3D structures by electrospun fibers The final part of the book depicts the applications of the electrospun nanofibers with sections describing in detail specific fields such as electrospun nanofiber reinforcement filtration electronic devices lithium ion batteries fuel cells biomedical field and so on One Dimensional Nanostructures Electrospinning Technique and Unique Nanofibers is designed to bring state of the art on electrospinning together into a single book and will be valuable resource for scientists in the electrospinning field and other scientists involved in biomedical field mechanical field materials and energy field Dr Zhenyu Li is an associate professor at the Dept of Chemistry Jilin University Changchun P R China Currently he also holds the position in Australian Future Fibres Research Innovation Centre Institute for Frontier Materials Deakin University Geelong Victoria Australia Dr Ce Wang is a professor at the Dept of Chemistry Jilin University Changchun P R China

**Electrospun Materials and Their Allied Applications** Inamuddin,Rajender Boddula,Mohd Imran Ahamed,Abdullah M. Asiri,2020-05-27 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

**Sustainable Materials for Electrochemical Capacitors** Inamuddin,Tariq Altalhi,Sayed Mohammed Adnan,2023-08-15 Sustainable Materials for Electrochemical Capacitors The book highlights the properties of sustainable materials for the production of commercial electrochemical capacitors Sustainable Materials for Electrochemical Capacitors details the progress in the usage of ubiquitous environmentally sustainable materials Due to their cost effectiveness flexible forms frequent accessibility and environmentally friendly nature electrochemical capacitors with significant surface areas of their carbon components are quite common Many novel ways for using bio derived components in highly efficient electrochemical capacitors are being established as a consequence of current research and this book provides details of all these developments The book provides A broad overview of properties explored for the development of electrochemical

capacitors Introduces potential applications of electrochemical capacitors Highlights sustainable materials exploited for the production of electrochemical capacitors Presents commercial potential of electrochemical capacitors Audience This is a useful guide for engineers materials scientists physicists and innovators who are linked to the development and applications of electrochemical capacitors      *21st Century Nanostructured Materials* Phuong Pham,2022-04-20 Nanostructured materials NMs are attracting interest as low dimensional materials in the high tech era of the 21st century Recently nanomaterials have experienced breakthroughs in synthesis and industrial and biomedical applications This book presents recent achievements related to NMs such as graphene carbon nanotubes plasmonic materials metal nanowires metal oxides nanoparticles metamaterials nanofibers and nanocomposites along with their physical and chemical aspects Additionally the book discusses the potential uses of these nanomaterials in photodetectors transistors quantum technology chemical sensors energy storage silk fibroin composites drug delivery tissue engineering and sustainable agriculture and environmental applications      *Electrospun Biomaterials for Tissue Engineering and Drug Delivery Applications* Inamuddin,Tariq Altalhi,Maha Khan,2025-05-30 Electrospun Biomaterials for Tissue Engineering and Drug Delivery Applications introduces the fundamental principles of electrospinning and provides an understanding of the electrospinning process including the selection of polymers solvent systems and processing parameters to achieve desired properties Tissue engineering applications of electrospun nanofibers across a wide range of tissues and organs is covered including bone cartilage skin blood vessels and more This book also explores the growing role of electrospun biomaterials in wound dressings and controlled drug delivery systems reviewing a broad selection of material classes such as starch cellulose chitosan and gelatin Electrospun Biomaterials for Tissue Engineering and Drug Delivery Applications is a useful resource for researchers and postgraduate students working in the fields of biomaterials tissue engineering and pharmaceutical sciences Divided into four distinct sections this book guides the reader systematically from fundamental principles of electrospinning through to each specialized application Provides troubleshooting for the challenges and toxicity aspects of electrospun biomaterials as well as reviews successful electrospun products on the market Covers a wide range of electrospun materials for tissue engineering and drug delivery including collagen dextran hyaluronic acid and more      **Electrospun Polymers and Composites** Yu Dong,Avinash Baji,Seeram Ramakrishna,2020-10-24 Electrospun Polymers and Composites Ultrafine Materials High Performance Fibres and Wearables reviews the latest technological developments and innovations in electrospun polymers and composites highlighting the multifunctionality of these ultrafine materials as high performance fibers The book s chapters investigate a wide range of different electrospinning applications including drug delivery tissue scaffolding fiber reinforcement and nanofiltration with a particular focus on shape memory effect and the wearable characteristics of electrospun polymers and composites This will be a valuable reference resource for research and for industrial communities working in the field of electrospinning Covers two important material systems in electrospun materials including electrospun

polymers and composites Emphasizes areas in shape memory effect and wearable features of electrospun polymers and composites Presents a multidisciplinary work that will attract a wide spectrum of readers in chemical engineering biomedical engineering chemistry pharmacy environmental science materials science and engineering as well as mechanical and electrical engineering **Industrial Applications of Marine Biopolymers** Parappurath Narayanan Sudha,2017-07-06

**Industrial Applications of Marine Biopolymers** presents different classes of marine biopolymers and their industrial applications demonstrating the precious value of ocean resources to society This timely volume discusses the exceedingly useful polymers derived from these materials that are biodegradable biocompatible and at times water soluble Direct use or chemically modified forms of such biomaterials have many chemical sites making them suitable for varied types of industrial applications In addition this book also addresses current global challenges of conservation including extended drought conditions and the need for improved agricultural methods together with new bio medical developments It is suitable for anyone who has an interest in the industrial applications of biopolymers **Thermal and Nonthermal Encapsulation**

**Methods** Magdalini Krokida,2017-09-27 Encapsulation is a topic of interest across a wide range of scientific and industrial areas from pharmaceuticals to food and agriculture for the protection and controlled release of various substances during transportation storage and consumption Since encapsulated materials can be protected from external conditions encapsulation enhances their stability and maintains their viability This book offers a comprehensive review of conventional and modern methods for encapsulation It covers various thermal and nonthermal encapsulation methods applied across a number of industries including freeze drying spray drying spray chilling and spray cooling electrospinning electrospraying osmotic dehydration extrusion air suspension coating pan coating and vacuum drying The book presents basic fundamentals principles and applications of each method enabling the reader to gain extended knowledge The choice of the most suitable encapsulation technique is based on the raw materials the required size and the desirable characteristics of the final products Nanostructured Materials for Food Packaging Applications Jissy Jacob,Ilaria Cacciotti,Sabu Thomas,2024-01-10

Nanostructured Materials for Food Packaging Applications brings together the latest advances in the preparation of nanostructured materials with the required properties and performance for food packaging applications The book begins by summarizing the state of the art opportunities challenges and solutions in terms of materials for packaging while also introducing the polymers and fillers in use their general characteristics and modifications This is followed by detailed coverage of characterization techniques fabrication methods and the possibilities for fully green nanoscale materials The subsequent chapters focus on specific nanomaterials and nanocomposites for food packaging covering a broad range of materials methods and properties The final chapters highlight functionalized nanomaterials intelligent and smart packaging systems kinetic studies modelling and simulation safety assessment and lifecycle assessment of food packaging materials This book will be of interest to researchers and advanced students across nanotechnology polymer science films barriers

coatings packaging food science chemistry and materials science as well as scientists engineers and R D professionals Covers a broad range of nanomaterials and nanocomposites for food packaging applications Guides the reader through characterization fabrication methods properties and analysis Considers intelligent and smart packaging systems safety assessment and lifecycle assessment **Electrospun Nanofibers from Bioresources for High-Performance**

**Applications** Praveen K.M., Rony Thomas Murickan, Jobin Joy, Hanna J. Maria, Jozef T. Haponiuk, Sabu Thomas, 2022-10-03

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 Highlights from TERMIS EU 2019 Dimitrios I.

Zeugolis, Maria Chatzinikolaidou, 2020-12-30 This eBook is a collection of articles from a Frontiers Research Topic Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series they are collections of at least ten articles all centered on a particular subject With their unique mix of varied contributions from Original Research to Review Articles Frontiers Research Topics unify the most influential researchers the latest key findings and historical advances in a hot research area Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office [frontiersin.org](mailto:frontiersin.org) about contact New Polymer Nanocomposites for Environmental Remediation Chaudhery Mustansar Hussain, Ajay Kumar Mishra, 2018-02-19 New Polymer Nanocomposites for Environmental Remediation summarizes recent progress in the development of materials properties fabrication methods and their applications for treatment of contaminants pollutant sensing and detection This book presents current research into how polymer nanocomposites can be used in environmental remediation detailing major environmental issues and key materials properties and existing polymers or nanomaterials that can solve these issues The book covers the fundamental molecular structure of polymers used in environmental applications the toxicology economy and life cycle analysis of polymer nanocomposites and an analysis of potential future applications of these materials Recent research and development in polymer nanocomposites has inspired the progress and use of novel and cost effective environmental applications Presents

critical actionable guidelines to the structure and property design of nanocomposites in environmental remediation Focuses on taking technology out of the lab and into the real world Summarizes the latest developments in polymer nanocomposites and their applications in catalytic degradation adsorptive removal and detection of contaminants in the environment Enables researchers to stay ahead of the curve with a full discussion of regulatory issues and potential new applications and materials in this area

**Electrospinning** Tomasz Arkadiusz Tanski,Pawel Jarka,2022-08 This book is a summary of the latest knowledge in the field of electrospinning technology including a detailed description of the method as well as the influence of its parameters on the structure and properties of manufactured materials Currently electrospinning is one of the most promising methods for the reproducible production of one dimensional nanostructures such as nanowires nanofibers and fibrous mats with high purity and dimensional accuracy Chapters address such topics as electrospun fibrous mats in the development of active food packaging production of structured nanofibers from natural sources and biomass waste as an alternative source of polymeric materials in electrospinning technology and more

**Electrospun Nanofibers** Kunal Mukherjee,Massachusetts Institute of Technology. Department of Materials Science and Engineering,2008 One dimensional nanostructures have several attractive material properties compared to their bulk counterparts and have found applications in many novel devices They have especially shown promise in the fields of renewable energy generation and environmental monitoring by improving solar cells and gas sensors However difficulties in large scale manufacturing of these nanostructures have prevented most of these devices from entering the marketplace Electrospinning is a simple versatile and scalable technique to fabricate one dimensional nanostructures in the form of nanofibers It has recently been successfully used to produce semiconducting metal oxide nanofibers which have been used in chemiresistive gas sensors and dye sensitized solar cells Electrospun gas sensors and solar cells have already been shown to perform better than many of its competitors in a very short period of time This coupled with low manufacturing costs and well protected intellectual property makes electrospinning a good candidate to bring the advantages of one dimensional nanostructures into the marketplace

**Electrospun Nanofibers** Ashok Vaseashta,Nimet Bölgen,2022-07-14 This book presents the development of electrospun materials fundamental principles of electrospinning process controlling parameters electrospinning strategies and electrospun nanofibrous structures with specific properties for applications in tissue engineering and regenerative medicine textile water treatment sensor and energy fields This book can broadly be divided into three parts the first comprises basic principles of electrospinning process general requirements of electrospun materials and advancement in electrospinning technology the second part describes the applications of electrospun materials in different fields and future prospects while the third part describes applications that can be used in advanced manufacturing based on conjoining electrospinning and 3D printing Electrospinning is the most successful process for producing functional nanofibers and nanofibrous membranes with superior chemical and physical properties The unique properties of electrospun materials including high surface to volume

ratio flexibility high mechanical strength high porosity and adjustable nanofiber and pore size distribution make them potential candidates in a wide range of applications in biomedical and engineering areas Electrospinning is becoming more efficient and more specialized in order to produce particular fiber types with tunable diameter and morphology tunable characteristics having specific patterns and 3D structures With a strong focus on fundamental materials science and engineering this book provides systematic and comprehensive coverage of the recent developments and novel perspectives of electrospun materials This comprehensive book includes chapters that discuss the latest and emerging applications of nanofiber technology in various fields specifically in areas such as wearable textile biomedical applications energy generation and storage water treatment and environmental remediation and sensors such as biomarkers in healthcare and biomedical engineering Despite all these advancements there are still challenges to be addressed and overcome for nanofiber technology to move towards maturation

*Needleless Electrospinning of Nanofibers* Xungai Wang, Tong Lin, 2013-11-14 The book covers the basic electrospinning theory electrospinning technologies that have potential for large scale production of nanofibers and the functional applications of electrospun nanofibers in different fields An important needleless electrospinning technique using a rotary fiber generator such as ball cylinder disc and wire coil and the effects of the fiber generator its shape and dimension as well as operating parameters on electrospinning performance fiber morphology and productivity are described A method to calculate the electric field and analyze electric field profiles in an electrospinning zone is provided The influence of the fiber collector on fiber quality is also discussed

Advanced Nanofibrous Materials Manufacture Technology based on Electrospinning Yanbo Liu, Ce Wang, 2019-04-23 This book comprehensively addresses advanced nanofiber manufacturing based on electrospinning technology The principles relationships between process parameters and structure morphology and performance of electrospun nanofibers and nanomaterials and the methods for enhanced field intensity and uniform distribution are discussed The electric field intensity and distribution during electrospinning is also analyzed based on finite element analysis on both the needle and the needleless electrospinning Furthermore the modification techniques for improved nanomaterials strength are covered aiming to provide effective avenues towards the manufacture of stronger nanofiber or nanomaterial products

**Electrospun Nanofibers** Santosh Kumar Tiwari, Kashma Sharma, Vishal Sharma, Vijay Kumar, 2021-09-14 The book provides an up to date account of the various techniques of fabrication functionalization of electrospun nanofibers as well as recent advancements An overview of the advanced applications of such techniques in different areas is also presented Both experimental and theoretical approaches related to electrospun nanofibers are covered along with a discussion on the inherent properties of electrospun nanofibers Therefore this book provides a unique resource not only to established researchers but also newcomers starting out in this field

Electrospinning Method Used to Create Functional Nanocomposites Films Tomasz Tański, Pawel Jarka, Wiktor Matysiak, 2018-09-12 The most effective method of producing nanofibres is the technology of producing in the



electrostatic field which does not require the use of complicated procedures and equipment Electrospinning allows to produce 1D nanostructures on an industrial scale in a relatively easy and quick way The method of electrospinning shares the most features with classical technologies in obtaining synthetic fibres that enable forming and generating a stream of previously dissolved or melted polymer and its coaxial stretching combined with the transition of the polymer from a liquid state to a solid state In view of the large application possibilities of electrospun fibres electrospinning is enjoying a dynamically growing interest of scientists which can be proven by the increasing trend of scientific publications

**Electrospinning: Nanofabrication and Applications** Bin Ding,Xianfeng Wang,Jianyong Yu,2018-11-12

Electrospinning Nanofabrication and Applications presents an overview of the electrospinning technique nanofabrication strategies and potential applications The book begins with an introduction to the fundamentals of electrospinning discussing fundamental principles of the electrospinning process controlling parameters materials and structures Nanofabrication strategies including coaxial electrospinning multi needle electrospinning needleless electrospinning electro netting near field electrospinning and three dimensional macrostructure assembling are also covered Final sections explore the applications of electrospun nanofibers in different fields and future prospects This is a valuable reference for engineers and materials scientist working with fibrous materials and textiles as well as researchers in the areas of nanotechnology electrospinning nanofibers and textiles Explores controllable fabrication of electrospun nanomaterials and their multifunctional applications Explains the electrospinning technique as used in nanofabrication and nanofibers Outlines the applications of electrospun nanofibrous materials in tissue engineering filtration oil water separation water treatment food technology supercapacitors sensors and so on

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