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SPRINGER SERIES ON BIOFILMS

Marine and Industrial Biofouling



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Marine And Industrial Biofouling Marine And Industrial Biofouling

**U. Kamachi Mudali, Toleti Subba Rao, S.
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Marine And Industrial Biofouling Marine And Industrial Biofouling:

Marine and Industrial Biofouling Hans-Curt Flemming,P. Sriyutha Murthy,R. Venkatesan,Keith E. Cooksey,2008-12-11 Biofouling is a costly problem and it is encountered in a wide spectrum of technical systems ranging from the shipping industry power industry water purification automobile industry paint and pharmaceuticals to the microelectronics and food industries Micro and macroorganisms attach to surfaces and accumulate there forming biofilms that cause interferences a fundamentally natural process Usually a medical paradigm is applied kill biofilms and the problem is solved This leads to excessive biocide use However the success of this strategy is very limited furthermore it leads to equipment damage and environmental pollution Simply trying to kill the fouling organisms is clearly not seen as a successful strategy while cleaning is put forward as much more important In this book strategies to prevent adhesion to mitigate the extent and effects of biofouling and to detect and remove fouling layers are presented Holistic approaches to the fouling process are elaborated taking into account options such as nutrient limitation repellent and easy to clean surfaces for fouling layer limitation and replacing biocides with more environmentally friendly methods in other words learning how to live with fouling biofilms without suffering the damage they can do Impact and Management of Marine Biofouling Yigit Kemal Demirel,Eugene Georgiades,Marlene Lejars,Kelli Zargiel Hunsucker,2022-08-04 **Polymer Adhesion, Friction, and Lubrication** Hongbo Zeng,2013-04-01 Specifically dedicated to polymer and biopolymer systems Polymer Adhesion Friction and Lubrication guides readers to the scratch wear and lubrication properties of polymers and the engineering applications from biomedical research to automotive engineering Author Hongbo Zeng details different experimental and theoretical methods used to probe static and dynamic properties of polymer materials and biomacromolecular systems Topics include the use of atomic force microscopy AFM to analyze nanotribology polymer thin films and brushes nanoparticles rubber and tire technology synovial joint lubrication adhesion in paper products bioMEMS and electrorheological fluids **Molecular and functional ecology of aquatic microbial symbionts** Hans-Peter Grossart,Lasse Riemann,Kam W. Tang, Nothing provided *Marine OMICS* Se-Kwon Kim,2016-11-18 This book provides comprehensive coverage on current trends in marine omics of various relevant topics such as genomics lipidomics proteomics foodomics transcriptomics metabolomics nutrigenomics pharmacogenomics and toxicogenomics as related to and applied to marine biotechnology molecular biology marine biology marine microbiology environmental biotechnology environmental science aquaculture pharmaceutical science and bioprocess engineering *Advances in Marine Antifouling Coatings and Technologies* Claire Hellio,Diego Yebra,2009-05-22 Marine biofouling can be defined as the undesirable accumulation of microorganisms algae and animals on structures submerged in seawater From the dawn of navigation marine biofouling has been a major problem for shipping in such areas as reduced speed higher fuel consumption and increased corrosion It also affects industries using off shore structures such as oil and gas production and aquaculture Growing concerns about the environmental impact of antifouling

coatings has led to major new research to develop more environmentally friendly alternatives Advances in marine antifouling coatings and technologies summaries this wealth of research and its practical implications This book is divided into four sub sections which discuss marine fouling organisms and their impact testing and development of antifouling coatings developments in chemically active marine antifouling technologies and new surface approaches to the control of marine biofouling It provides an authoritative overview of the recent advances in understanding the biology of fouling organisms the latest developments on antifouling screening techniques both in the field and in the laboratory research on safer active compounds and the progress on nontoxic coatings with tailor made surface properties With its distinguished editors and international team of contributors Advances in marine antifouling coatings and technologies is a standard reference for manufacturers of marine antifouling solutions the shipping industry oil and gas producers aquaculture and other industries using offshore structures and academics researching this important area Assesses marine antifouling organisms and their impact including a historical review and directions for future research Discusses developments in antifouling coatings examining chemically active and new surface approaches Reviews the environmentally friendly alternative of safer active compounds and the progress of non toxic compounds

Biofouling and Biocorrosion in Industrial Water Systems

Hans-Curt Flemming, Gill G. Geesey, 2012-12-06 Microbial growth and contamination Biofouling in water systems represents a significant threat to the quality of waters produced for the microelectronic pharmaceutical petroleum paper food and other manufacturing industries Biofouling can lead to biologically induced corrosion Biocorrosion which can cause severe damage to the equipment Both biofouling and biocorrosion are frequently not recognized in time underestimated or linked with the wrong causes The book represents a new approach by introducing biofilm properties and dynamics as basic principles of biofouling and biocorrosion thus providing a better understanding and the means of fighting the undesired effects of biofilms The most important features are Case histories of biofouling in water treatment Detection and monitoring of biofouling Reverse osmosis membrane biofouling Biocide efficacy and biofouling control Plant design considerations for preventing biofouling Case histories of biocorrosion Detection monitoring control and prevention of biocorrosion Fundamentals of biofouling and biocorrosion mechanisms

Operational and Environmental Consequences of Large Industrial Cooling Water Systems Sanjeevi Rajagopal, Henk A. Jenner, Vayalam P. Venugopalan, 2012-01-07 The use of water for industrial purposes is of foremost importance It is used as a coolant and industrial activities dealing with power generation steel and iron paper and pulp and oil require very large amounts of water The industry therefore resorts to large scale abstraction of water from natural water bodies This water is often treated with chemicals to combat operational problems like biofouling and corrosion Such withdrawal and subsequent discharge of large amounts of water have the potential to impart significant impact on the recipient water body The organisms drawn along with the cooling water as well as those residing at the discharge zone are subjected to a combination of mechanical thermal and chemical stress on a continuous basis

Advances in

Nanotechnology for Marine Antifouling Ram K. Gupta, Ashok Kumar Nadda, Swati Sharma, Muhammad Bilal, Tuan Anh Nguyen, 2023-04-11 Advances in Nanotechnology for Marine Antifouling surveys the latest research in the application of nanotechnology for biofouling inhibition The book gathers in depth information on the various micro and nano techniques nanocoatings polymeric composites paints methods of application and prevention mechanisms This is a valuable resource for researchers and advanced students across anti biofouling nanotechnology nanomaterials polymer nanocomposites coatings maritime technology chemistry chemical engineering environmental science and materials science and engineering This is also essential reading for industrial scientists engineers R D and other professionals with an interest in the use of nanotechnology for antifouling particularly in the maritime sector Nanotechnologies have been recognized as a powerful tool in antifouling strategies with nanocoatings with efficient properties enabling increased durability and performance in the prevention of biofouling and corrosion while replacing potentially more harmful chemicals Examines the fundamentals of biofouling conventional techniques modeling and simulation and biofouling based on natural materials Provides detailed techniques for antifouling mechanisms and materials with a range of specific properties or applications Addresses key environmental challenges including risks of novel nanomaterials and coatings development of eco friendly nanocoatings regulations and future scope

Environmental Consequences and Management of Coastal Industries Michael Elliott, Andrew Wither, 2023-11-11 Environmental Consequences and Management of Coastal Industries Terms and Concepts covers the engineering natural and social sciences aspects related to coastal power plants and their operation and management The book gives background to featured problems and solutions making it relevant to power plants in all global situations and giving practitioners what they need to assess environmental consequences In addition the book indicates defines and illustrates the terms and concepts used worldwide This is important as engineers and scientists often have an imperfect understanding of the requirements of each other and similar in some cases identical terms may have very different meanings Users will find this to be a simple and accessible guide to the terminology used and concepts covered Individual entries are complete in themselves but still cross referenced to other entries where additional information may be found This provides quick and easy access to the required information Provides a unique approach that acts as a first stop shop for complementary interests with entries presented on separate pages Presents multidisciplinary content thus ensuring that different functions understand others priorities and concerns Includes comprehensive content with wide ranging coverage written by experts with many decades of experience in environmental aspects of coastal power plans and other industries

A Modern Approach to Biofilm-Related Orthopaedic Implant Infections Lorenzo Drago, 2017-05-16 This book discusses Prosthetic Joint Infection PJI which remains one of the most common problems necessitating revision arthroplasty It pursues a multidisciplinary approach bringing together opinions from the leading experts in the field The book identifies the potential causes of these infections provides sound diagnostic criteria guidelines and explains how these prosthetic

infections are managed from orthopedic surgery clinical and diagnostic perspectives PJI can lead to multiple revision surgeries and significant patient morbidity Periprosthetic infection rates remain around 1-2% after primary total hip and knee arthroplasty and account for approximately 7-12% of all revision cases Orthopedic hardware infections are much feared and costly complications that can occur when these devices are implemented both in traumatic cases as well as in joint replacement surgery Because these infections can lead to higher morbidity it is important to understand their pathophysiology and the principles behind their diagnosis and initial treatment The pathogenesis of these kinds of infections is intimately connected to the biofilm producing trait characteristic of many microorganisms which can have a critical effect on the likely success of treatments The book offers a unique guide for all scientists working in arthroplasty who are seeking an update on the field and for newcomers alike

Aquatic Ecosystems and Microbial Biofilms Siddhardha Busi, Ram Prasad, 2024-10-01 Aquatic Ecosystems and Microbial Biofilms Significance Dynamics Prevention and Control provides a systematic introduction and review of state of the art information on microbial biofilms in aquatic ecosystems and their control The book is designed and developed to understand the microbial biofilms in aquatic ecosystems their role and the control strategies The contents of the book are well discussed to get state of art knowledge on various topics such as the role of biofilms in marine ecosystems microbial biofilms and drinking water systems biofilms in biofouling and biocorrosion beneficial aspects of biofilms such as biogeochemical cycling wastewater treatment and in biodeterioration of organic materials This book also provides comprehensive knowledge and in depth scientific information on the role of biofilms and their contribution to antibiotic resistance and also advanced technologies to understand biofilms such as metagenomics The book offers comprehensive coverage of the most essential topics including Microbial biofilms in aquatic ecosystems New horizons to understand the role of biofilms in biofouling and corrosion and their control measures Beneficial role of aquatic biofilms such as in biogeochemical cycling wastewater treatment and biodeterioration of organic materials Various strategies to collaborate interdisciplinary schemes worldwide to design and develop new methods for cleaner drinking water and information on advanced techniques such as metagenomics to understand the diversity and functional role of aquatic biofilms This book serves as a reference book for scientific investigators who would like to study biofilms in aquatic ecosystems as well as researchers developing methodology in this field to study biofilm formation in aquatic ecosystems their advantages and disadvantages and control strategies

Algal Green Chemistry Rajesh Prasad Rastogi, Datta Madamwar, Ashok Pandey, 2017-04-14 Algal Green Chemistry Recent Progress in Biotechnology presents emerging information on green algal technology for the production of diverse chemicals metabolites and other products of commercial value This book describes and emphasizes the emerging information on green algal technology with a special emphasis on the production of diverse chemicals metabolites and products from algae and cyanobacteria Topics featured in the book are exceedingly valuable for researchers and scientists in the field of algal green chemistry with many not covered in current academic studies It is a

unique source of information for scientists researchers and biotechnologists who are looking for the development of new technologies in bioremediation eco friendly and alternative biofuels biofertilizers biogenic biocides bioplastics cosmeceuticals sunscreens antibiotics anti aging and an array of other biotechnologically important chemicals for human life and their contiguous environment This book is a great asset for students researchers and biotechnologists Discusses high value chemicals from algae and their industrial applications Explores the potential of algae as a renewable source of bioenergy and biofuels Considers the potential of algae as feed and super food Presents the role of triggers and cues to algal metabolic pathways Includes developments in the use of algae as bio filters *Lab-on-a-chip Devices for Advanced Biomedicines* Arpana Parihar,Piyush Pradeep Mehta,2024-08-14 The global miniature devices market is poised to surpass a valuation of 12 15 billion USD by the year 2030 Lab on a chip LOC devices are a vital component of this market Comprising a network of microchannels electrical circuits sensors and electrodes LOC is a miniaturized integrated device platform used to streamline day to day laboratory functions run cost effective clinical analyses and curb the need for centralized instrumentation facilities in remote areas Compact design portability ease of operation low sample volume short reaction time and parallel investigation stand as the pivotal factors driving the widespread acceptance of LOC within the biomedical community In this book the Editors meticulously explore LOC through three key Ts Theories microfluidics microarrays instrumentation software Technologies additive manufacturing artificial intelligence computational thinking smart consumables scale up tactics and biofouling and Trends biomedical analysis point of care diagnostics personalized healthcare bioactive synthesis disease diagnosis and space applications This comprehensive text not only provides readers with a thorough understanding of the current advancements in the LOC domain but also offers valuable insights to support the utilization of miniaturized devices for enhanced healthcare practices Aimed at career researchers looking for instruction in the topic and newcomers to the area the book is also useful for undergraduate and postgraduate students embarking on new studies or for those interested in reading about the LOC platform LaQue's Handbook of Marine Corrosion David A. Shifler,2022-07-01 The new edition of LaQue s classic text on marine corrosion providing fully updated control engineering practices and applications Extensively updated throughout the second edition of La Que s Handbook of Marine Corrosion remains the standard single source reference on the unique nature of seawater as a corrosive environment Designed to help readers reduce operational and life cycle costs for materials in marine environments this authoritative resource provides clear guidance on design materials selection and implementation of corrosion control engineering practices for materials in atmospheric immersion or wetted marine environments Completely rewritten for the 21st century this new edition reflects current environmental regulations best practices materials and processes with special emphasis placed on the engineering behavior and practical applications of materials Divided into three parts the book first explains the fundamentals of corrosion in marine environments including atmospheric corrosion erosion microbiological corrosion fatigue environmental cracking and cathodic delamination The

second part discusses corrosion control methods and materials selection that can mitigate or eliminate corrosion in different marine environments The third section provides the reader with specific applications of corrosion engineering to structures systems or components that exist in marine environments This much needed new edition Presents a comprehensive and up to date account of the science and engineering aspects of marine corrosion Focuses on engineering aspects descriptive behavior and practical applications of materials usage in marine environments Addresses the various materials used in marine environments including metals polymers alloys coatings and composites Incorporates current regulations standards and recommended practices of numerous organizations such as ASTM International the US Navy the American Bureau of Shipping the International Organization for Standardization and the International Maritime Organization Written in a clear and understandable style La Que s Handbook of Marine Corrosion Second Edition is an indispensable resource for engineers and materials scientists in disciplines spanning the naval maritime commercial shipping industries particularly corrosion engineers ship designers naval architects marine engineers oceanographers and other professionals involved with products that operate in marine environments

Legacy and Emerging Contaminants in Water and Wastewater Paromita Chakraborty, Daniel Snow, 2022-06-03 This volume provides a collection of research findings on the distribution and risk associated with emerging contaminants ECs in water and wastewater across the globe and effective remediation techniques and technologies The book covers various monitoring techniques for ECs in water and wastewater and its related impacts on the ambient environment and offers valuable information on cost effective monitoring techniques and sustainable treatment technologies for ECs The authors detail the risks and biological effects of ECs and legacy persistent organic pollutants POPs in freshwater and marine systems including their adverse interactions with aquatic organisms while also discussing the associated impacts on human health The book comprehensively covers current research outcomes on treatment methods cost effectiveness and infrastructure needs for effective removal of ECs It will be of interest to students researchers and scholars in environmental science and engineering water and wastewater toxicology environmental biotechnology soil sciences and microbial ecology

Silver-Based Antimicrobials Raymond J. Turner, 2021-02-22 There is some talk about an antibiotic Armageddon due to quickly developing resistance towards commercially available antibiotics For the most part the classical antibiotic pipeline has dried up and antibiotic resistance to any new drugs quickly develops It is here that metal based antimicrobials can step forward as possible solutions in this antimicrobial resistance era The biological targets of metal atoms are more diverse thus making it more difficult for bacteria to develop resistance compared with classical antibiotics The metal silver has been used since antiquity for wound healing and water purification At present it is the most prevalent antimicrobial metal used in healthcare industry and consumer products Silver is being used in the form of ionic salt colloids or in specific nanomaterials and as described in this book it can be applied as mixtures with other antimicrobials or coating composites The different formulations are explored for their efficacy against a variety of problems related to agricultural and

medical infections Whilst by no means exhaustive this book nicely highlights the present directions in silver based antimicrobial research and antimicrobial formulation development The chapters have been organized from a general introductory review to approaches of mixing other antimicrobials and materials to enhance silver performance This is followed by synthetic approaches First are biogenic sometimes called green or eco friendly approaches followed by advanced physical chemical synthetic approaches The book ends with an overview of applications through a review of patents over the past 10 years

Rhizosphere Engineering and Stress Resilience in Plants Piyush Mathur, Soumya Mukherjee, 2025-04-10 In the hidden realm beneath our feet a complex network of interactions unfolds between plant roots and the surrounding soil The rhizosphere is a zone of intense biological and chemical activity which plays a critical role in shaping plant growth nutrient uptake and ecosystem functioning Recent advances in our understanding of root signaling and rhizosphere engineering have revealed the vast potential for manipulating these interactions to enhance crop productivity improve soil health and mitigate environmental stresses It is worthwhile to decipher the molecular signals and nutrient exchanges between plants and microbes which can in turn facilitate to design an innovative strategy to optimize rhizosphere functioning It is imperative to bring about the development of more climate resilient crops improve soil carbon sequestration and reduce the need for synthetic fertilizers This field also offers opportunities for novel biotechnological applications including the development of microbe based biofertilizers and biopesticides As we continue to face the challenges of a growing global population and environmental degradation rhizosphere engineering offers a cutting edge solution to crop productivity It enables harnessing the power of plant microbe interactions unlocking new avenues for sustainable agriculture and ecosystem restoration This preface sets the stage for exploring the latest advances and future directions in rhizosphere engineering highlighting its potential to revolutionize our understanding of soil ecosystems and promote a more sustainable future This book explores the cutting edge science and applications of rhizosphere engineering and root signaling bringing together insights from plant biology soil science microbiology and ecology Unraveling the intricate communication networks between roots and soil can unveil new strategies for sustainable agriculture ecosystem restoration and environmental resilience

A Treatise on Corrosion Science, Engineering and Technology U. Kamachi Mudali, Toleti Subba Rao, S. Ningshen, Radhakrishna G. Pillai, Rani P. George, T. M. Sridhar, 2022-05-04 This volume elaborates on various corrosion processes in different applications and their prevention strategies It comprehensively covers the principles of corrosion engineering issues methods of corrosion protection and defines corrosion processes and control in select aggressive end industrial environments The contents especially focus on corrosion issues in nuclear aerospace marine high temperature bioimplants automobile and addresses the application of advanced materials to mitigate them A special section on corrosion prevention strategies with innovative solutions to resolve corrosion issues in various environments is the highlight of this book This volume will be a useful guide for those in research academia and industry particularly to know state of art in

corrosion control and prevention for various practical applications

Challenges and Innovations in Ocean In Situ

Sensors Eric Delory, Jay Pearlman, 2018-09-21 Challenges and Innovations in Ocean In Situ Sensors Measuring Inner Ocean Processes and Health in the Digital Age highlights collaborations of industry and academia in identifying the key challenges and solutions related to ocean observations A new generation of sensors is presented that addresses the need for higher reliability e g against biofouling better integration on platforms in terms of size and communication and data flow across domains in situ space etc Several developments are showcased using a broad diversity of measuring techniques and technologies Chapters address different sensors and approaches for measurements including applications quality monitoring and initiatives that will guide the need for monitoring Integrates information across key marine and maritime sectors and supports regional policy requirements on monitoring programs Offers tactics for enabling early detection and more effective monitoring of the marine environment and implementation of appropriate management actions Presents new technologies driving the next generation of sensors allowing readers to understand new capabilities for monitoring and opportunities for another generation of sensors Includes a global vision for ocean monitoring that fosters a new perspective on the direction of ocean measurements

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