Biologically-Inspired Systems

Hermann Ehrlich

# Biological Materials of Marine Origin

Vertebrates



Oregon State University. Graduate School

*Biological Materials of Marine Origin* Hermann Ehrlich, 2014-12-01 This is the second monograph by the author on biological materials of marine origin The initial book is dedicated to the biological materials of marine invertebrates This work is a source of modern knowledge on biomineralization biomimetics and materials science with respect to marine vertebrates For the first time in scientific literature the author gives the most coherent analysis of the nature origin and evolution of biocomposites and biopolymers isolated from and observed in the broad variety of marine vertebrate organisms fish reptilian birds and mammals and within their unique hierarchically organized structural formations. There is a wealth of new and newly synthesized information including dozens of previously unpublished images of unique marine creatures including extinct extant and living taxa and their biocomposite based structures from nano to micro and macroscale This monograph reviews the most relevant advances in the marine biological materials research field pointing out several approaches being introduced and explored by distinct modern laboratories Marine Biological Materials of Invertebrate Origin Hermann Ehrlich, 2019-10-17 The work is a source of modern knowledge on biomineralization biomimetics and bioinspired materials science with respect to marine invertebrates. The author gives the most coherent analysis of the nature origin and evolution of biocomposites and biopolymers isolated from and observed in the broad diversity of marine invertebrate organisms and within their unusual structural formations. The basic format is that of a major review article with liberal use of references to original literature There is a wealth of new and newly synthesized information including dozens of previously unpublished images of unique marine creatures and structures from nano to microscale including high resolution scanning and transmission electron micrographs The material is organized effectively along both biological phyla and functional lines The classification of biological materials of marine origin is proposed and discussed Much of the pertinent data is organized into tables and extensive use is made of electron micrographs and line drawings Several modern topics e g biomineralization demineralization remineralization phenomena or phenomenon of multiphase biomineralization are discussed in details Traditionally such current concepts as hierarchical organization of biocomposites and skeletal structures structural bioscaffolds biosculpturing biomimetism and bioinspiration as tools for the design of innovative materials are critically analyzed from both biological and materials science point of view using numerous unique examples of marine origin This monograph reviews the most relevant advances in the marine biomaterials research field pointing out several approaches being introduced and explored by distinct laboratories **Extreme Biomimetics** Hermann Ehrlich, 2016-10-01 This book discusses the current direction of the research approach to extreme biomimetics through biological materials inspired chemistry and its applications in modern technology and medicine It is a resource covering topics of extreme psychrophilic and thermopilic biomineralization solvothermal and hydrothermal chemistry of metal oxides and nanostructured composites and bioinspired materials science in a diverse areas The authors review the current advances in

the extreme biomimetics research field and describe various approaches introduced and explored by their respective laboratories Details the basic principles of extreme biomimetics approach for design of new materials and applications Includes numerous examples of the hierarchical organization of hydrothermally or psychrophilically obtained biocomposites structural bioscaffolds biosculpturing biomimetism and bioinspiration as tools for the design of innovative materials Describes and details the principles of extreme biomimetics with respect to metallization of chemically and thermally stable Biological Materials of Marine Origin Hermann Ehrlich, 2010-11-03 This text is the first ever to offer a coherent analysis of the nature origin and evolution of biocomposites and biopolymers found within the broad variety of marine invertebrate organisms and their unusual structural formations It is an interdisciplinary look at the biomineralization biomimetics and materials science unique to marine invertebrates In this seminal work Hermann Ehrlich for the first time proposes the classification biological materials of marine origin He uses numerous unique examples of marine origin to critically analyze many current relevant concepts from both the biological and materials science perspectives including hierarchical organization of biocomposites and skeletal structures structural bioscaffolds biosculpturing and biomimetism In addition he covers many modern topics never before available in textbook format such as phenomenon of multiphase biomineralization biomineralization demineralization remineralization phenomena and silica collagen and silica chitin biocomposites And he reviews the most relevant advances in the marine biomaterials research field detailing the applications of biomaterials science in modern technology and medicine Complete with tables electron micrographs line drawings and dozens of previously unpublished images of unique marine structures Biological Materials of Marine Origin is aimed at scientists and students concerned with the world of marine biological materials **Blast Mitigation Strategies in Marine** Composite and Sandwich Structures Srinivasan Gopalakrishnan, Yapa Rajapakse, 2017-12-14 This book primarily focuses on methodologies to enable marine structures to resist high velocity impact loadings It is based on invited talks presented at the recent India USA workshop on Recent Advances in Blast Mitigation Strategies in Civil and Marine Composite Structures The book comprises content from top researchers from India and the USA and covers various aspects of the topic including modeling and simulation design aspects experimentation and various challenges These failure modes significantly reduce the structural integrity of the marine structures unless they are designed to resist such harsh loadings Understanding the mechanics of these structures under harsh loadings is still an open area of research and the behavior of these structures is not fully understood The book highlights efforts to reduce the effects of blast loadings on marine composite structures Intended for researchers scientists and practicing engineers the book focuses not only the design and analysis challenges of marine composite structures under such harsh loading conditions but also provides new design guidelines **Biology of** Sharks and Their Relatives Jeffrey C. Carrier, Colin A. Simpfendorfer, Michael R. Heithaus, Kara E. Yopak, 2022-06-08 Biology of Sharks and Their Relatives is an award winning and groundbreaking exploration of the fundamental elements of

the taxonomy systematics physiology and ecology of sharks skates rays and chimera This edition presents current research as well as traditional models to provide future researchers with solid historical foundations in shark research as well as presenting current trends from which to develop new frontiers in their own work Traditional areas of study such as age and growth reproduction taxonomy and systematics sensory biology and ecology are updated with contemporary research that incorporates emerging techniques including molecular genetics exploratory techniques in artificial insemination and the rapidly expanding fields of satellite tracking remote sensing accelerometry and imaging With two new editors and 90 contributors from the US UK South Africa Portugal France Canada New Zealand Australia India Palau United Arab Emirates Micronesia Sweden Argentina Indonesia Cameroon and the Netherlands this third edition is the most global and comprehensive yet It adds six new chapters representing extensive studies of health stress disease and pathology and social structure and continues to explore elasmobranch ecological roles and interactions with their habitats The book concludes with a comprehensive review of conservation policies management and strategies as well as consideration of the potential effects of impending climate change Presenting cohesive and integrated coverage of key topics and discussing technological advances used in modern shark research this revised edition offers a well rounded picture for students and researchers

Bioinspired Devices Eugene C. Goldfield, 2018-01-08 Eugene Goldfield lays out principles of engineering found in the natural world with a focus on how components of coordinated structures organize themselves into autonomous functional systems This self organizing capacity is one of many qualities which can be harnessed to design technologies that can interact seamlessly with human bodies **Mechanisms and Ecology of Suspended-Particle Capture in Marine** Systems Jeff Shimeta, Marco Ghisalberti, Nicole Rita Posth, Stuart Humphries, 2025-02-07 The dynamics and capture of suspended particles constrain numerous processes in marine ecosystems such as suspension feeding and trophic interactions aggregation and sedimentation larval and propagule dispersal and settlement and the increasing impacts of micro and nanoplastics in the environment The interdisciplinary research in these areas draws heavily on fluid and particle dynamics filtration theory surface chemistry and modelling and experimentation with marine organisms This Research Topic focuses on recent advances in interdisciplinary approaches to modelling predicting and measuring particle capture and extensions of these concepts to emerging issues such as the transport and fate of micro and nanoplastics in the marine environment An insightful and inspiring review that will direct future research is also sought <u>Integrative Fish Biomechanics</u>, 2025-10-01 Integrative Fish Biomechanics Volume 41 the latest release in the Fish Physiology series highlights new advances in the field with this volume presenting insightful chapters written by leading experts Covering a wide range of topics this edition explores the intricate hydrodynamics and biomechanics of fish feeding swimming and terrestrial locomotion It delves into the structural and functional properties of fish tissues providing a deeper understanding of their mechanical adaptations Other chapters examine the sensing and control of fish behaviour the role of biomechanics in fish adhesion and the emerging field

of fish robotics The volume also discusses the ecomechanics of fish locomotion and feeding collective behaviours and the micro and macroevolutionary perspectives of fish biomechanics Offering a comprehensive look at the intersection of biology physics and engineering this book provides valuable insights for researchers marine biologists and those interested in fish physiology and biomechanics Provides the authority and expertise of leading contributors from an international board of authors Presents the latest release in the Fish Physiology series Updated release includes the latest information on Integrative Fish Biomechanics 

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