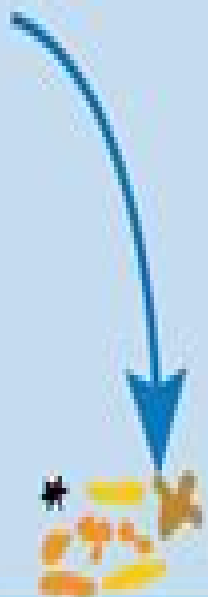


BIOFILM FORMATION

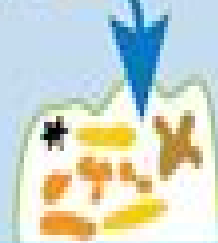
Adhesion to
surface

Bacteria



Biofilm
formation

EPS

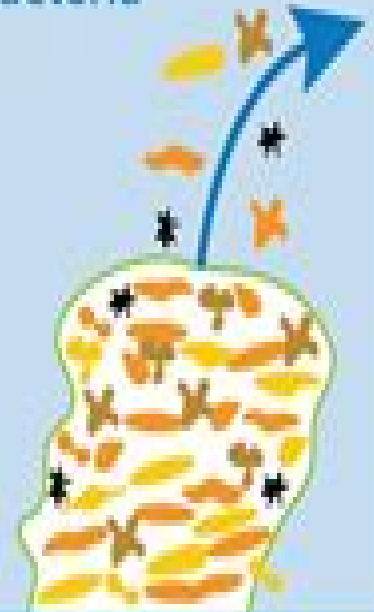


Growth – other
organisms attach
and bacteria multiply



Release – planktonic
bacteria released

Bacteria



SURFACE

Structure And Function Of Biofilms

William G. Characklis, P. A. Wilderer



Structure And Function Of Biofilms:

Structure and Function of Biofilms William G. Characklis, P. A. Wilderer, 1989 Structure and Function of Biofilms W G Characklis P A Wilderer Editors Biofilms the accumulation of microorganisms at surfaces e g a rock a heat exchanger tube an oil droplet a tooth or a medical implant play an important role in nature and have recently received increasing attention in science as well as in technology This volume contains a summary of the current state of knowledge concerning the behavior of microorganisms in a biofilm and their physical chemical and biological interactions with each other and with the environment at both the biofilm substratum and the biofilm bulk liquid interfaces New techniques to investigate biofilms and to predict the performance of biofilm systems are presented and future research needs are identified An excellent source of information for microbiologists medical scientists and engineers is provided *Structure and Function of Biofilms* William G. Characklis, P. A. Wilderer, 1989 Structure and Function of Biofilms W G Characklis P A Wilderer Editors Biofilms the accumulation of microorganisms at surfaces e g a rock a heat exchanger tube an oil droplet a tooth or a medical implant play an important role in nature and have recently received increasing attention in science as well as in technology This volume contains a summary of the current state of knowledge concerning the behavior of microorganisms in a biofilm and their physical chemical and biological interactions with each other and with the environment at both the biofilm substratum and the biofilm bulk liquid interfaces New techniques to investigate biofilms and to predict the performance of biofilm systems are presented and future research needs are identified An excellent source of information for microbiologists medical scientists and engineers is provided **Biofilms from a Food Microbiology Perspective: Structures, Functions and Control Strategies** Avelino Alvarez-Ordóñez, Romain Briandet, 2017-03-17 Materials and equipment in food processing industries are colonized by surface associated microbial communities called biofilms In these biostructures microorganisms are embedded in a complex organic matrix composed essentially of polysaccharides nucleic acids and proteins This organic shield contributes to the mechanical biofilm cohesion and triggers tolerance to environmental stresses such as dehydration or nutrient deprivation Notably cells within a biofilm are more tolerant to sanitation processes and the action of antimicrobial agents than their free living or planktonic counterparts Such properties make conventional cleaning and disinfection protocols normally not effective in eradicating these biocontaminants Biofilms are thus a continuous source of persistent microorganisms including spoilage and pathogenic microorganisms leading to repeated contamination of processed food with important economic and safety impact Alternatively in some particular settings biofilm formation by resident or technological microorganisms can be desirable due to possible enhancement of food fermentations or as a means of bioprotection against the settlement of pathogenic microorganisms In the last decades substantial research efforts have been devoted to unravelling mechanisms of biofilm formation deciphering biofilm architecture and understanding microbial interactions within those ecosystems However biofilms present a high level of complexity and many aspects remain yet to be fully

understood A lot of attention has been also paid to the development of novel strategies for preventing or controlling biofilm formation in industrial settings Further research needs to be focused on the identification of new biocides effective against biofilm associated microorganisms the development of control strategies based on the inhibition of cell to cell communication and the potential use of bacteriocins bacteriocin producing bacteria phage and natural antimicrobials as anti biofilm agents among others This Research Topic aims to provide an avenue for dissemination of recent advances within the biofilms field from novel knowledge on mechanisms of biofilm formation and biofilm architecture to novel strategies for biofilm control in food industrial settings

Biofilms L V Evans,2003-09-02 Biofilms affect the lives of all of us growing as they do for example on our teeth as plaque on catheters and medical implants in our bodies on our boats and ships in food processing environments and in drinking and industrial water treatment systems They are highly complex biological communities whose detailed structure and functioning is only gradually being unravelled with the development of increasingly sophisticated technology for their study Biofilms almost always have a negative impact on human affairs flocs in sewage treatment plants are a major exception and a lot of research is being carried out to gain a better understanding of them so that we will be in a better position to control them This volume with contributions by international experts from widely diverse areas of this field presents a state of the art picture of where we are at present in terms of our knowledge of biofilms the techniques being used to study them and possible strategies for controlling their growth more successfully It should provide a valuable reference source for information on biofilms and their control for many years to come Understanding Bacteria: Structure, Function and Importance in Biology Dr. Sophia Zaidi,2025-07-12

Biofilms in Medicine, Industry and Environmental Biotechnology Piet Lens,V. O'Flaherty,A. P. Moran,P. Stoodley,T. Mahony,2003-04-30 Biofilms are of great practical importance for beneficial technologies such as water and wastewater treatment and bioremediation of groundwater and soil In other settings biofilms cause severe problems for example in 65% of bacterial infections currently treated by clinicians particularly those associated with prosthetics and implants accelerated corrosion in industrial systems oil souring and biofouling Until recently the structure and function of biofilms could only be inferred from gross measures of biomass and metabolic activity This limitation meant that investigators involved in biofilm research and application had only a crude understanding of the microbial ecology physical structure and chemical characteristics of biofilms Consequently opportunities for the exploitation and control of biofilms were very limited The past decade has witnessed the development of several new techniques to elucidate the structure and function of biofilms Examples include the use of molecular probes that identify different microbes in complex communities as well as their metabolic functions the use of microsensors that show concentration gradients of key nutrients and chemicals the use of confocal laser scanning microscopy to describe the physical structure of biofilms and the development of a new generation of mathematical models that allow for the prediction of biofilm structure and function However much progress remains to be made in efforts to understand control and exploit

biofilms This timely book will introduce its readers to the structure and function of biofilms at a fundamental level as determined during the past decade of research including Extracellular polymers as the biofilm matrix Biofilm phenotype differential gene expression interspecies signalling Biofilm ecology Biofilm monitoring Resistance of biofilms to antimicrobial agents and Biofilm abatement Biofilms in Medicine Industry and Environmental Technology offers a holistic and multi disciplinary description of the topic including biofilm formation and composition but also biofilm monitoring disinfection and control All these aspects are presented from three points of views medical industrial and environmental biotechnological in a compact easy to read format *Microbial Extracellular Polymeric Substances* Jost Wingender, Thomas R. Neu, Hans-Curt Flemming, 2012-12-06 Microbial extracellular polymeric substances EPS are the key components for the aggregation of microorganisms in biofilms flocs and sludge They are composed of polysaccharides proteins nucleic acids lipids and other biological macromolecules EPS provide a highly hydrated gel matrix in which microbial cells can establish stable synergistic consortia Cohesion and adhesion as well as morphology structure biological function and other properties such as mechanical stability diffusion sorption and optical properties of microbial aggregates are determined by the EPS matrix Also the protection of biofilm organisms against biocides is attributed to the EPS Their matrix allows phase separation in biofiltration and is also important for the degradation of particulate material which is of great importance for the self purification processes in surface waters and for waste water treatment Microbial Biofilms Mahmoud Ghannoum, Matthew Parsek, Marvin Whiteley, Pranab K. Mukherjee, 2020-08-11 An examination of the research and translational application to prevent and treat biofilm associated diseases In the decade since the first edition of Microbial Biofilms was published the interest in this field has expanded spurring breakthrough research that has advanced the treatment of biofilm associated diseases This second edition takes the reader on an exciting extensive review of bacterial and fungal biofilms ranging from basic molecular interactions to innovative therapies with particular emphasis on the division of labor in biofilms new approaches to combat the threat of microbial biofilms and how biofilms evade the host defense Chapters written by established investigators cover recent findings and contributions from investigators new to the field provide unique and fresh insights Specifically Microbial Biofilms provides state of the art research in the field of bacterial and fungal biofilms detailed descriptions of the in vitro and in vivo models available to evaluate microbial biofilms future areas of research and their translational and clinical applications Microbial Biofilms is a useful reference for researchers and clinicians It will also provide insight in the dynamic field of microbial biofilms for graduate and postgraduate students Microbial Biofilm Dynamics Ashutosh Kumar Shukla, Douglas Roberto Monteiro, 2025-08-01 This book explores the dynamics of microbial biofilms examining their role in both oral and systemic diseases emphasizing developmental models and presenting various characterization and detection methodologies Divided into three sections the introductory section covers fundamental concepts including microbial biofilm understanding the critical role of the extracellular matrix antimicrobial resistance

mechanisms and the relevance of biofilms to the dental and medical fields It also explores the development of novel antimicrobial therapeutic strategies for biofilm control including diverse approaches like light nanoparticle peptide phage and phytochemical based strategies along with surface modification techniques The second section navigates the diverse spectrum of biofilm complexity introducing laboratory models such as microtiter plate formation dynamic formation active attachment and in situ and in vivo formation models thus providing a comprehensive understanding of experimental setups The third section focuses on crucial analytical methods for biofilm studies covering techniques for quantifying total biomass cultivable cells and metabolism It further describes technical approaches to biofilm matrix analysis Omics techniques flow cytometry analysis imaging techniques and the electrochemical detection of biofilms An overview of machine learning approaches in biofilm research is also covered This book is tailored for researchers scientists and students of microbiology

Key Features Provides an in depth exploration of microbial biofilms covering their dynamics associations with oral and systemic diseases and emphasizing developmental models Covers the role of the extracellular matrix antimicrobial resistance mechanisms and the development of novel antimicrobial therapeutic strategies Explores a diverse spectrum of biofilm complexity through various laboratory models Focuses on crucial analytical methods covering techniques for quantifying total biomass cultivable cells and metabolic activity Describes techniques for biofilm matrix analysis Omics techniques flow cytometry analysis imaging techniques electrochemical detection and the application of machine learning in biofilm research

Productive Biofilms Kai Muffler, Roland Ulber, 2014-10-15 This book review series presents current trends in modern biotechnology The aim is to cover all aspects of this interdisciplinary technology where knowledge methods and expertise are required from chemistry biochemistry microbiology genetics chemical engineering and computer science Volumes are organized topically and provide a comprehensive discussion of developments in the respective field over the past 3 5 years The series also discusses new discoveries and applications Special volumes are dedicated to selected topics which focus on new biotechnological products and new processes for their synthesis and purification In general special volumes are edited by well known guest editors The series editor and publisher will however always be pleased to receive suggestions and supplementary information Manuscripts are accepted in English

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