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Advancements in Biosurfactants Research

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Preface

Microorganisms create a structurally varied category of surface-active chemicals known as biosurfactants. Biosurfactants have been investigated as a potential substitute for synthetic surfactants in numerous industrial processes, including food, medicine, biotechnology, petroleum, oil recovery, biomedical and therapeutic, and bioremediation, due to the rising worldwide need for sustainable solutions. The book will cover a variety of current biosurfactants research advancements and progresses. The book will also cover the most recent academic advances, major applications, and implementation studies from across the world. It will be a valuable resource for research organizations, research institutes, university libraries, and R&D involved in recent surfactant research and development.

The book is divided into four parts, and each part contains numerous chapters. PART 1 explores the "overview and economic aspect of biosurfactants production." Topics covered in Chapters "Biosurfactants: Types, Sources, and Production" to "Surface Activity and Emulsification Properties of Saponins as Biosurfactants" are types, sources, characterization, purification, biodegradation, and cytotoxic aspects of biosurfactants. PART 2 discusses the biosurfactant's industrial applications. Topics covered in Chapters "Biosurfactants as Emulsifying Agents in Food Formulation" to "The Role of Biosurfactants in Biofuel Production" are the application of biosurfactants in nanoparticle synthesis, heavy metal remediation, drug absorption, waste treatment, agriculture management, marine sediment remediation of organic pollutants, biofuel production, emulsification, and anti-corrosive applications. PART 3 discusses the biosurfactant's biomedical applications. Topics covered in Chapters "Role of Biosurfactants in Biocidal Activity and Wound Healing" to "Role of Biosurfactants in Biofilm Prevention and Disruption" are the application of biosurfactants as biocidal, wound healing, and anti-tumor agents. This section also covers the applications of biosurfactants in oral cavity care, and biofilm prevention and disruption. PART 4 discusses the biosurfactant's commercialization, challenges, and future outlook. Topics covered in Chapters "Advantages and Disadvantages of Biosurfactants over Other Synthetic Surfactants" to "Biosurfactants: Challenges and

Future Outlooks" are the advantages of biosurfactants over synthetic surfactants, commercialization, challenges, and future outlook of biosurfactants.

This book is intended for a very wide-ranging audience working in the fields of advanced surface science, chemistry, colloids and interfaces science, chemical engineering & technology, etc. This book will be an invaluable reference source for libraries in universities and industrial institutions, government and independent institutes, individual research groups, and scientists. Overall, this book is written for scholars and students in academia and industry, working in the field of colloids and interface science, applied and engineering chemistry.

The editors and contributors are renowned researchers and scientists from academia. On behalf of Springer-Nature, we are very thankful to the contributors of all chapters for their amazing and passionate efforts in the making of this book. Our special thanks are dedicated to Dr. Cansu Kaya (Associate Editor) and Mr. Srinivasan Manavalan (Project Coordinator) and the Editorial Team at Springer-Nature for their devoted support and help during this project. In the end, all gratitude goes to Springer-Nature for publishing the book.

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Part II Biosurfactants: Current Industrial Applications

Biosurfactants as Potential Antitumor Agents

C. I. Ukaegbu, S. R. Shah, R. O. Alara, and O. A. Thonda

1 Introduction

Biosurfactants are microorganism-produced molecules with surface activity that can be used in a variety of biomedical applications. They are microbially produced amphiphilic surface-active chemicals with significant implications in medicine, food, and bioremediation. Exopolysaccharide (EPS) sheaths surround bacteria in biofilms, protecting them from harmful circumstances. Chemical surfactants have long dominated the market, but attention has recently shifted to the extraction of biosurfactants with reduced toxicity and increased biodegradability (Peele and Ch 2016). Biosurfactants have an intriguing biological activity profile and could potentially be used as antitumor medicines. Biosurfactants have in-vitro antiproliferative activity as reported against human lung cancer cells, as well as antibacterial activities against certain pathogens (Karlapudi et al. 2018). Although biosurfactants have been identified as potential antimicrobial drug candidates in numerous studies, their role in cancer biology has been understudied.

Biosurfactants' antitumor potential is being investigated, even though data on the mechanisms of such action are still rare (Gudiña et al. 2013; Rodrigues 2011). Several studies have shown that biosurfactants separate at interfaces, influencing the adherence of microbes (Rivardo et al. 2009; Mireles et al. 2001; Velraeds et al. 1998). By breaking and lysing microbial cell membranes, these chemicals can

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