Preface

With better appreciation of biopolymers derived from marine organisms, there has been increased interest in their biomedical and industrial applications. Some such important molecules are chitin, chitosan, oligosaccharides, and their derivatives, which have attracted significant interest in view of their broad range of applications, including in the biomedical, agricultural, food science, and technological fields, and in various industries. Chitin is a naturally abundant mucopolysaccharide, and is the second-most abundant natural biopolymer after cellulose. Nature produces approximately 10^{11} tons of chitin annually worldwide as a by-product, and industrial use has been estimated at 10,000 tons annually. Chitosans are water-insoluble polymers, formed by the deacetylation of chitins, and have important biological properties. In order to exploit the potential of these molecules more fully and to increase their applications in diverse scientific areas, researchers transformed these complex substances into low-molecular-weight oligosaccharides known as chitooligosaccharides (COSs). As in the case of amino acids, which are building blocks of proteins; less than 100 units of glucosamine get connected to form COSs, which have low viscosity and relatively small molecular sizes [<1–18 kDa, i.e., 100 × 180 (MW of the glucosamine)], which in turn make them water soluble and readily absorbable in *in vivo* systems. A wide range of sources and technological approaches for these biologically useful biopolymers have been identified, but the significance of their diversity and the applicability of the different forms of these remarkable substances have yet to be determined. A wealth of knowledge and diversity is continuously being added to the oceans, which are the key sources for these natural substances as compared to terrestrial resources.

This book, *Chitin, Chitosan, Oligosaccharides, and Their Derivatives: Biological Activities and Applications*, covers the key aspects of chitin, chitosan, oligosaccharides, and their derivatives, namely, their properties, sources, production, and applications in the biological, biomedical, industrial, and agricultural fields. Part I provides an overview of the sources and production of chitin and chitosan derivatives; Part II describes their physical and chemical aspects; Part III discusses their structural modifications for biomedical applications; Part IV deals with their biological activities, in particular, antimicrobial, anti-inflammatory, antioxidant, antihypertensive, anticancer, and antidiabetic activities; Part V describes their biomedical applications, including their possible applications as drug, vaccine, and gene carriers; Part VI discusses their industrial applications; and, finally, Part VII covers their agricultural applications. The chapters in each part are a good collection of comprehensive research on these polymers carried out by proficient scientists from around the world. In addition, the preparation methodologies for these polymers have also been well depicted by various contributors in their respective chapters. I am quite certain that the findings and latest information presented in this book will be helpful for upcoming researchers to establish phenomenal research from an intersection of multiple research areas.

I am grateful to all the chapter authors who have provided the state-of-the art contributions in the field of chitin/chitosan; their relentless effort was the result of scientific attitude, drawn from the past history in this field. I also thank the staff of Taylor & Francis Group and CRC Press for their continual support, which was essential for the successful completion of this book. I hope that the fundamental ideas presented in this book serve as potential research and development material for the benefit of humankind.

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