

The background of the cover is a complex, multi-layered molecular structure. It consists of numerous interconnected spheres (atoms) in red, grey, and light orange, connected by thin grey lines (bonds). The structure is dense and three-dimensional, with some parts appearing more prominent than others, creating a sense of depth and complexity. The overall appearance is that of a crystalline or highly ordered molecular lattice.

Jun-ichi Kadokawa  
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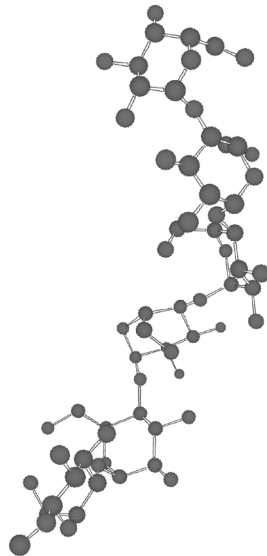
# ENGINEERING OF POLYSACCHARIDE MATERIALS

By Phosphorylase-Catalyzed  
Enzymatic Chain-Elongation

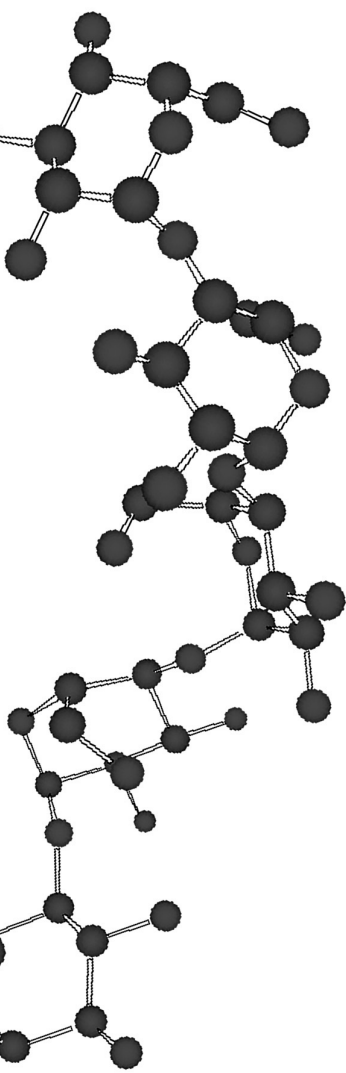




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# Contents

<b>1. Introduction</b>	<b>1</b>
1.1 Important Features in Polysaccharides	1
1.2 Concept in Synthesis of Polysaccharides	4
<b>2. General Scope for Enzymatic Tools in Engineering of Polysaccharide Materials</b>	<b>9</b>
2.1 Characteristic Features of Enzymatic Reactions for Synthesis of Polysaccharides	9
2.2 Synthesis of Polysaccharides Catalyzed by Hydrolases	13
2.3 Synthesis of Polysaccharides Catalyzed by Sucrase-Type Enzymes	16
<b>3. Phosphorylase-Catalyzed Enzymatic Glycosylation</b>	<b>21</b>
3.1 Fundamental Features of Phosphorylases	21
3.2 Outlines of Phosphorylase Catalyses	23
3.3 Phosphorylase-Catalyzed Glycosylation	30
<b>4. Phosphorylase-Catalyzed Enzymatic Polymerization</b>	<b>43</b>
4.1 Outlines of Phosphorylase-Catalyzed Polymerization	43
4.2 Thermostable Phosphorylase Catalysis	44
4.3 Practical Applications of Phosphorylase-Catalyzed Polymerization	45
<b>5. Chemoenzymatic Synthesis of Amylose-Grafted Synthetic Polymers by Utilizing Phosphorylase Catalysis</b>	<b>51</b>
5.1 Outlines of Chemoenzymatic Synthesis of Amylose-Grafted Synthetic Polymers by Utilizing Phosphorylase Catalysis	51
5.2 General Chemical Reactions to Link Maltooligosaccharide to Polymer Backbones or Polymerizable Groups	53

5.3	Chemoenzymatic Synthesis of Amylose-Grafted Polystyrene	55
5.4	Chemoenzymatic Synthesis of Amylose-Grafted Polyacetylene	56
5.5	Chemoenzymatic Synthesis of Amylose-Grafted Poly(Vinyl Alcohol)	59
5.6	Chemoenzymatic Synthesis of Amylose-Grafted Polydimethylsiloxane	61
5.7	Chemoenzymatic Synthesis of Amylose-Grafted Silica Gel	63
<b>6.</b>	<b>Chemoenzymatic Synthesis of Amylose-Grafted Biopolymers by Utilizing Phosphorylase Catalysis</b>	<b>69</b>
6.1	Outlines of Chemoenzymatic Synthesis of Amylose-Grafted Biopolymers by Utilizing Phosphorylase Catalysis	69
6.2	Chemoenzymatic Synthesis of Amylose-Grafted Chitin and Chitosan	70
6.3	Chemoenzymatic Synthesis of Amylose-Grafted Cellulose	72
6.4	Chemoenzymatic Synthesis of Amylose-Grafted Anionic Polysaccharides	75
6.5	Chemoenzymatic Synthesis of Amylose-Grafted Polypeptide	77
<b>7.</b>	<b>Preparation of Amylose–Polymer Inclusion Complexes in Phosphorylase-Catalyzed Enzymatic Polymerization (“Vine-Twining Polymerization”)</b>	<b>81</b>
7.1	Outlines of Vine-Twining Polymerization	81
7.2	Preparation of Amylose–Poly(Tetrahydrofuran) Inclusion Complex	82
7.3	Preparation of Inclusion Complex Using Other Polyethers as Guest Polymers	88
7.4	Preparation of Amylose–Polyester Inclusion Complexes	89
7.5	Preparation of Amylose–Polycarbonate Inclusion Complexes	91



<b>8. Extension of Vine-Twining Polymerization by Phosphorylase Catalysis</b>	<b>97</b>
8.1 Selective Inclusion of Amylose in Vine-Twining Polymerization	97
8.1.1 Amylose Selectively Includes One from Mixtures of Two Resemblant Guest Polymers	97
8.1.2 Amylose Selectively Includes a Specific Range of Molecular Weights in Polymers	100
8.1.3 Amylose Recognizes Chirality in Poly(Lactide)s	104
8.2 Preparation of Inclusion Complexes Composed of Amylose and Strongly Hydrophobic Polyesters in Parallel Enzymatic Polymerization System	107
8.3 Preparation of Hydrogels through the Formation of Inclusion Complex of Amylose	109
<b>9. Carbohydrate Engineering by Phosphorylase Catalysis</b>	<b>113</b>
9.1 Facile Synthesis of Glc-1-P from Starch by <i>Thermus Caldophilus</i> GK24 Phosphorylase	113
9.2 Amylose Production by Combined Use of Phosphorylase with Other Phosphorylases	113
9.3 Synthesis of Branched Glucan by Combined Use of Phosphorylase with Branching Enzyme	115
<b>10. Preparation of Amylose-Based Nanomaterials by Phosphorylase Catalysis</b>	<b>119</b>
10.1 Outlines of Nanomaterials Produced by Self-Assembly or Complex Formation of Macromolecules	119
10.2 Phosphorylase-Catalyzed Synthesis and Molecular Assembly of Amylosic Block Copolymers	120
10.3 Formation of Amylose–Lipid Complexes through Phosphorylase-Catalyzed Polymerization	123
<i>Index</i>	129



# Preface

Polysaccharides and related compounds are attracting much attention because of their potential for the applications as new functional materials in many research fields such as medicine, pharmaceuticals, food, and cosmetics. Therefore, precision synthesis of new polysaccharides with well-defined structure is becoming increasingly important. For this purpose, enzymatic method is a very powerful tool because the reaction proceeds in a highly stereo- and regiocontrolled manner. Furthermore, the structurally complicated polysaccharides are synthesized by the enzymatic method. Among the enzymes that have been employed for the synthesis of polysaccharides, phosphorylase exhibits a potential to be used for the practical synthesis of  $\alpha$ -glucans. However, this enzyme had not been used in the wide variety of polysaccharide researches compared with hydrolases (glycosidases and glycanases). Nowadays, however, the phosphorylase-catalyzed reaction (polymerization and chain elongation) has been well-known and a major category in the enzymatic synthesis of polysaccharides.

This book focuses on the advances in the practical synthesis of polysaccharides by the phosphorylase-catalyzed chain elongation on the basis of the viewpoint of polysaccharide engineering. Chapter 1 presents an overview of the importance of polysaccharides in materials engineering. The following three chapters deal with the fundamental aspects and characteristic features in the phosphorylase catalysis. The latter six chapters describe the practical synthesis of various polysaccharides materials by the phosphorylase catalysis, including polysaccharide-synthetic polymer hybrids, heteropolysaccharides, polysaccharide supramolecules, soft materials, and nanomaterials.

We believe that this book will provide an active source of information for research in polysaccharide science and engineering. Furthermore, this publication is directed to researchers and engineers in various academic and practical fields interested in the importance of polysaccharide materials.

We are indebted to the coworkers, whose names can be found in the references from our papers, for their enthusiastic collaborations. Finally, we wish to thank Mr. Stanford Chong, director and publisher, Pan Stanford Publishing, and his colleagues for their valuable contributions to this publication, which have been necessary in order to fruitfully accomplish the work.

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