V. Yuryev, P. Tomasik, E. Bertoft (Eds.), Starch: Achievements in Understanding of Structure and Functionality, Nova Science Publishers, New York, NY, USA, 2007 (ix + 315 pp., $145.00, ISBN 1-60021-227-1)

Starch, an important plant energy reserve, is composed of two glucan polymers, namely amylose and amylopectin, synthesised in the form of microscopic granules in the tissues of many plant species. Due to their compact structure, starch granules are insoluble in water at ambient temperature. Granule morphology and amylose:amylopectin ratio generally varies according to the botanical source. Amylose is a linear polymer of (1 → 4)-linked-α-D-glucopyranosyl (α-D-Glc*p*) residues, whereas amylopectin also has (1 → 4)-linked α-D-Glc*p* but also has (1 → 6)-linked branch points every 24–30 glucose residues. Starch occurs in seeds, roots, tubers, fruits and stems of plants, and is a primary dietary energy source for animals and man. '*Starch: Achievements in Understanding of Structure and Functionality*' contains selected conference presentations (16 Chapters) covering theoretical and applicative aspects of starch chemistry and technology presented at the XIII International Starch Convention, held in Moscow, Russia.

In spite of achievements in understanding of enzyme-catalysed reactions occurring during the biosynthesis of starch polysaccharides, the processes of assembly of starch granules and the resulting semi-crystalline structures are poorly known. Model presentations describing the structural organisation of starch granules, specifically the location of amylose in wheat and potato starch granules, are detailed in Chapter 1; the chain-length distribution profiles of endosperm starch from *Triticum–Aegilops* species in Chapter 2, and the physicochemical and structural characteristics of endosperm starches of rice cultivars bred in Japan in Chapter 3. Amylopectin contains both short and long chains, which form interconnected clusters, and has a chemical structure similar to glycogen, however glycogen is much more highly branched. The structure of the limit dextrins obtained from amylopectin and glycogen are compared and contrasted (Chapter 4). Polysaccharide–polysaccharide hydrocolloid interactions are discussed in Chapter 5. The complexation (trapping and retention) of aroma compound ligands with amylose, to assess interactions between a Viennese pastry aroma and a food matrix (sponge cake) are detailed in Chapter 6, whilst Chapter 7 focuses on the encapsulation of lipids in starch molecules using microwave heating.

The effects of linearly polarised visible light on the structural arrangement of sago starch and its physicochemical properties are detailed in Chapter 8. Increasing interest in environmentally-benign polymers has led to the development of a range of thermoplastic starches (TPS), obtained by amorphisation and plasticisation of native starch. The hydrophilicity of such polymers needs to be reduced for certain applications, and can be done so by the use of electron beam (EB) irradiation to graft lignin derivatives onto the TPS (Chapter 9). The effect of high pressure, time of treatment, and polysaccharide composition (different amylose contents) on the physicochemical properties of starches and their mixtures are also presented (Chapter 10).

The structure and properties of type III resistant starches in gels and bread produced from high-amylose wheat flour (from Winter Bulava wheat grown in central Russia) are covered in Chapter 11. This is of particular interest for type II diabetes mellitus sufferers as it can help with reduction of glycaemic loading, compared with normal bread consumption. The thermo-mechanical behaviour of a crumb during such processes as chilling and freezing is presented in Chapter 12, whilst the following Chapter (13) details the effects of parboiling on the properties of rice. The final three Chapters (14–16) cover complexes of single-wall carbon nanotubes with dextrans and agarose, interactions of cereal starches with selected polysaccharide hydrocolloids, and the application of hydrocolloids and oat hydrolysate in mayonnaise production. The latter chapter details the use of oat hydrolysate as a potential fat replacer.

Overall, this authoritative volume provides a wealth of detailed information on the structure of starch granules and the effect of structure and structural changes on the functional properties of starch, with respect to specific highlighted applications. Some collection of the chapters into similar topic areas (presumably along the lines of specific sessions within the conference) would have assisted the reader to obtain information from specific subject areas.

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H. Dodziuk (Ed.), Cyclodextrins and their complexes: Chemistry, analytical methods, applications, Wiley-VCH, Weinheim, Germany, 2006 (xvii+489 pp., €149.00, ISBN: 3-527-31280-3)

Cyclodextrins are naturally occurring homochiral macrocyclic oligosaccharides composed of 6–13 1 → 4-linked α-D-glucopyranosyl (α-D-Glc*p*) units. They possess annular structures whose wide and narrow hydrophilic ends are delineated by OH(2) and OH(3) secondary and OH(6) primary hydroxyl groups, respectively, whereas their hydrophobic annular interiors are lined with methyl and methylene groups and ether oxygens. The great interest in

cyclodextrins and their derivatives is due to their ability to partially or completely include a wide range of guest species within their annuli to form inclusion complexes, also referred to as host–guest complexes.

'*Cyclodextrins and Their Complexes*' is composed of 16 chapters, which aim to provide an extensive description of all of the important aspects of research and applications involving cyclodextrins, beginning with an introductory chapter by the volume editor that covers their theoretical aspects, properties, non-rigidity, and models of chiral recognition by cyclodextrins. This is followed by detailed information on modification reactions and the chemistry of modified cyclodextrins (Chapter 2). Specific topics covered include selective derivatisation of primary and secondary hydroxyl groups, enzymatic modification, cyclodextrin dimers and trimers, charged cyclodextrins, chemosensors, cyclodextrin analogues, conjugates with peptides and saccharides, and metallocavitands. Polymers involving cyclodextrin moieties are discussed in the third chapter, which deals with the formation of supramolecular assemblies such as cyclic daisy chain structures, poly[2]rotaxanes, helical polymers, alternating α/β-cyclodextrin polymers, and host–guest polymer complexes, whilst the fourth chapter covers cyclodextrin catalysis, which generally proceeds via inclusion–complexation with the substrates and is characterised by high selectivity and rapid reaction rates.

The next two chapters (5 and 6) deal with chromatographic studies of molecular and chiral recognition, and the application of cyclodextrins for enantioseparations. determination of the stoichiometry and stability of cyclodextrin complexes, and the use of cyclodextrin-based stationary phases in GC, HPLC, and CZE, are covered. The next four chapters (7–10) are concerned with structural analysis of cyclodextrins, their derivatives, and their inclusion complexes, and include information on crystallographic studies (Chapter 7), microcalorimetry (Chapter 8), NMR (Chapter 9), and other physical methods (Chapter 10), which includes mass spectrometry, UV–vis absorption and emission spectroscopy, circular dichroism, electrochemistry, and scanning probe microscopy techniques (such as STM and AFM). Different approaches to the modelling of cyclodextrins and their complexes are presented in Chapter 11, such as quantum chemical calculations, molecular mechanics studies, and dynamic simulations, and is followed by an overview of native and synthetically-modified cyclodextrins used as molecular components in the self-assembly of interlocking molecules such as rotaxanes, pseudo-rotaxanes and catenanes (Chapter 12). Chapter 13 deals with large-ring cyclodextrins (with a degree of polymerisation of 9 and above), specifically their production, isolation, purification, physicochemical properties, structures and inclusion complexes.

Cyclodextrins and their derivatives have application and potential application as molecular containers in a wide range of applications, and the last three chapters of this volume (14–16) focus upon their current, developing and potential future applications. They are widely utilised in the pharmaceutical industry (Chapter 14), to improve solubility and oral bioavailability of poorly water-soluble drugs, to increase drug stability, in controlled drug release applications (immediate, prolonged, modified and delayed release profiles), and also have application in site-specific drug delivery. The unique role of cyclodextrins in dispersed systems, such as emulsions, microparticles, microcapsules, microspheres, nanoparticles, lipidic vesicles, liposomes, and their polymeric forms, is detailed in the penultimate chapter (15), whilst the final chapter covers other present and prospective application areas, such as in the food, cosmetic, toiletry, textile, and wrapping material industries, and in areas of agrochemistry and molecular devices.

In conclusion, this detailed monograph does indeed provide a comprehensive account of the important aspects of research and applications involving cyclodextrins and their derivatives, and is therefore highly recommended for all individuals with interests in any aspects of cyclodextrin technology and supramolecular structure formation and resultant applications.

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Matyjaszewski, K., Gnanou, Y., Leibler, L. (Eds.), Macromolecular engineering: Precise synthesis, materials properties, applications (4 volume set), Wiley-VCH, Weinheim, Germany, 2007 (clvi+2826 pp., €599.00, ISBN: 3-527-31446-1)

Polymer science has continually developed throughout the last century, and such developed synthetic polymers are now routinely used in almost all aspects of our modern material world. The wide diversity of synthetic polymer properties has permitted their application in the development of many modern technologies and they are an essential part of everyday products, such as plastic bags, CDs/DVDs, sports and outdoor equipment, and are also employed in larger-scale lightweight construction in the military and aviation sectors. More recent developments in control and design of macromolecular properties have been achieved through controlled manipulation of synthesis processes, resulting in a new approach in polymer science called 'macromolecular engineering'.

The first volume in this four-volume set is composed of 16 chapters that cover a wide range of macromolecular