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.

John F. Kennedy
Agnieszka Szymańska
Chembiotech Laboratories,
Institute of Research and Development,
University of Birmingham Research Park,
97 Vincent Drive, Edgbaston,
Birmingham B15 2SQ, UK

Available online 25 October 2007

doi:10.1016/j.carbpol.2007.10.011

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

synthesis techniques. Synthetic techniques covered include anionic polymerisation of vinyl and related monomers, carbocationic polymerisation, ionic and coordination ring-opening polymerisation, radical polymerisation, polycondensation, supramolecular polymer engineering, polymer synthesis and modification by enzymatic catalysis (using oxidoreductases and hydrolases), segmented copolymers by mechanistic transformations, polymerisations in aqueous dispersed media, polymerisation under light and other external stimuli, and inorganic polymers with precise structures. Specific materials presented include protein-based polymeric materials, polypeptides using ring-opening polymerisation of amino acid carboxyanhydrides, and the synthesis of new homo- and co-polymer architectures from ethylene and propylene using homogeneous Ziegler–Natta polymerisation catalysts. A discussion of recent trends in macromolecular engineering is also provided. Free-radical and coordination polymerisation processes are used to make most of the synthetic polymers in the current commercial marketplace. Polycondensation is an important method used for production of fibres, engineering plastics, and electrical materials.

The second volume comprises 16 chapters concerned with elements of macromolecular structural control, including tacticity, macromonomer and telechelic oligomer synthesis by living polymerisation, statistical, alternating and gradient copolymers, multisegmental block/graft copolymers, cyclic polymers, star-related structures, linear versus (hyper)branched polymers, microgels, functional dendrimers, densely grafted copolymers (molecular brushes), grafting and polymer brushes on solid surfaces, hybrid organic inorganic objects, core–shell particles, polyelectrolyte multilayer films (biofunctional coatings), bio-inspired complex block copolymers/polymer conjugates, and complex functional macromolecules.

The third volume contains 15 chapters detailing structure-property correlations and characterisation techniques. Specific characterisation techniques presented include AFM, light scattering, scanning calorimetry, chromatography, and NMR spectroscopy, TEM (for bulk and solution morphologies elucidation), and dynamics and rheology (of linear and (hyper)branched polymers). Other topics presented in this volume include experimental aspects of self-assembly and morphology diagrams for solution and bulk materials, transport and electro-optical properties, simulations, mechanical performance prediction, polymer networks, block copolymers for adhesive applications, reactive blending, and high-throughput screening in combinatorial polymer research.

The fourth volume contains 18 chapter that focus on specific types of polymers and/or application areas. Topics covered include thermoplastic elastomers based on styrenic block copolymers, nanocomposites, layered filler nanocomposites, dispersants, surfactants, molecular and supramolecular conjugated polymers for electronic applications, microelectronics, controlled macromolecular architectures for lithographic applications, microelectronic materials with hierarchical organisation, semiconducting polymers and their optoelectronic applications, encapsulation of metallic and semiconductor nanoparticles, membranes for gas separation, water purification and fuel cell technology, sensor devices, polymeric drugs, biomineralisation polymers and double hydrophilic block and graft copolymers, bioconjugates, artificial soft tissue, and tissue engineering. IUPAC polymer terminology and macromolecular nomenclature is also provided.

This comprehensive set of volumes on macromolecular engineering is an indispensable reference source for all individuals involved in the design and processing of synthetic polymers for current and future applications, and is therefore highly recommended for polymer science students, academics, and industrialists, alike.

Charles J. Knill
John F. Kennedy *
Karolina Gluza
Chembiotech Laboratories,
Institute of Research and Development,
University of Birmingham Research Park,
97 Vincent Drive, Edgbaston,
Birmingham B15 2SQ, UK

Available online 25 October 2007

* Corresponding author.
doi:10.1016/j.carbpol.2007.10.012