



Topological Polymer Chemistry: Progress of Cyclic Polymers in Syntheses, Properties and Functions

Yasuyuki Tezuka

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There are examples aplenty in the macroscopic world that demonstrate the form of objects directing their functions and properties. On the other hand, the fabrication of extremely small objects having precisely defined structures has only recently become an attractive challenge, which is now opening the door to nanoscience and nanotechnology.

In the field of synthetic polymer chemistry, a number of critical breakthroughs have been achieved during the first decade of this century to produce an important class of polymers having a variety of cyclic and multicyclic topologies. These developments now offer unique opportunities in polymer materials design to create unprecedented properties and functions simply based on the form, i.e. topology, of polymer molecules.

In this book on topological polymer chemistry, the important developments in this growing area will be collected for the first time, with particular emphasis on new conceptual insights for polymer chemistry and polymer materials. The book will systematically review topological polymer chemistry from basic aspects to practice, and give a broad overview of cyclic polymers covering new synthesis, structure characterization, basic properties/functions and the eventual applications.

Contents:

• *Topological Polymer Chemistry - Concepts and Practices:*

- Systematic Classification of Nonlinear Polymer Topologies (*Yasuyuki Tezuka*)
- Topological Isomers in Polymer Molecules (*Yasuyuki Tezuka*)
- Telechelics Having Cyclic Onium Salt Groups (*Yasuyuki Tezuka*)
- Electrostatic Self-Assembly and Covalent Fixation (ESA-CF) Process (*Yasuyuki Tezuka*)
- Dynamic Control of Polymer Topologies by the ESA-CF Process (*Yasuyuki Tezuka*)
- Cyclic and Multicyclic Polymers Having Functional Groups (*Kyklo-Telechelics*) (*Yasuyuki Tezuka*)
- Metathesis Polymer Cyclization (*Yasuyuki Tezuka*)
- Multicyclic Polymer Topologies by the ESA-CF with *Kyklo-Telechelic* Precursors (*Yasuyuki Tezuka*)

• *Cyclic Polymers - Developments in the New Century:*

- Overview on Physical Properties of Cyclic Polymers (*Jacques Roovers*)
- The Ring-Closure Approach for Synthesizing Cyclic Polymers (*Boyu Zhang and Scott M Grayson*)
- Cyclic Macromonomers: Synthesis and Properties (*Masataka Kubo*)
- Topological Effects on the Statistical and Dynamical Properties of Ring Polymers in Solution (*Tetsuo Deguchi and Kyoichi Tsurusaki*)
- Dynamics of Cyclic Polymers Revealed by Single-Molecule Spectroscopy (*Satoshi Habuchi*)
- Progress in the Rheology of Cyclic Polymers (*Dimitris Vlassopoulos, Rossana Pasquino and Frank Snijkers*)
- Crystallization of Cyclic and Branched Polymers (*Hiroki Takeshita and Tomoo Shiomi*)
- Self-Assembly and Functions of Cyclic Polymers (*Eisuke Baba and Takuya Yamamoto*)

Readership: Graduate students, professionals and researchers in chemistry.

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