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1. Main Research Results

Synthesis, functionalization, and integration of rotaxane or polyrotaxane were studied.

- (1) Main-chain-type polyrotaxane was synthesized from crown ether-type-pseudo[2]rotaxane. The obtained polyrotaxane is showed the increasing of thermal stability and solubility by comparison of naked linear axle polymer.
- (2) Side-chain-type polyrotaxane having conjugated polymer chain was synthesized by polymerization of [2]rotaxane. As the result cyclic oligomers were obtained in good yield. This is the first example of cyclic polyrotaxane.
- (3) The effect of rotaxane structure as reaction field such as enzyme was studied. In addition to the examination of asymmetric benzoin condensation catalytic reaction, the dynamic steric protection effect in rotaxane system was also studied.

2. List of publication (original article, comment/book)

1) Original Paper

- (1) Thiazolium-Tethering Rotaxane-Catalyzed Asymmetric Benzoin Condensation: Unique Asymmetric Field ; Constructed by The Cooperation of Rotaxane Components, Yuya, Tachibana, Nobuhiro, Kihara, Kazuko Nakazono, Toshikazu Takata, *Phosphorus, Sulfur, and Silicon and the Related Elements, in press.*

2) Review & Book

- (1) Control of Super-Hierarchical Structures and Innovative Functions of Next-Generation Conjugated Polymers; Toshikazu Takata, Kazuko Nakazono, (Chapter 2, Section 17: Synthesis and Property of rotaxane organization cumulated in a helical manner, Kazuo Akagi Ed., CMC, Tokyo, 2009, p.225-231.
- (2) Topology Designing, Toshikazu Takata, Kazuko Nakazono, (Synthesis, Structure and application of topological supramolecule), NTS, *in press.*

3. Invited/Plenary Talks in Conference

1) International Conference or Workshop

- (1) Kazuko Nakazono, Tomonori Ishino, and Toshikazu Takata, Synthesis of Main Chain-Type Polyrotaxane by Polymerization of Homoditopic Pseudorotaxane Monomers, Poster No. 0765, The 42nd IUPAC World Polymer Congress, MACRO 2008 (Jun. 29 - Jul. 4, 2008), Taipei, Taiwan

2) Domestic Conferences

- (1) Tomonori Ishino, Kazuko Nakazono, Yasuhito Koyama, and Toshikazu Takata, Main Chain-Type Polyrotaxanes Consisting of Crown Ethers and *sec*-Ammonium Salts, Poster 42, LXII Yamada

Conference 2008 "Topological Molecules" (1st-4th September, 2008), Awaji Yumebutai International Conference Center, Hyogo, Japan

- (2) Kazuko Nakazono and Toshikazu Takata, Structure and Property of Neutral Rotaxanes Having Crown Ether Wheel, Poster 54, LXII Yamada Conference 2008 "Topological Molecules" (1st-4th September, 2008), Awaji Yumebutai International Conference Center, Hyogo, Japan

4. Patent

1 application.