



Toshiki AOKI, Dr.Eng.

Professor

Program: Advanced Materials Science and Technology

Area: Applied Chemistry and Chemical Engineering

Undergraduate: Dep.of Chemistry and Chemical Engineering

Professional Expertise

His professional expertise is polymer chemistry including synthesis of functional polymers, especially asymmetric polymers and membrane science, especially optical resolution membranes. He and his group have found new monomers and polymerization method such as helix-sense-selective polymerization of substituted acetylenes and found new permselective membranes such as optical resolution membranes.

Research Fields of Interest

Polymer chemistry

- Conjugated Polymers, Poly(substituted acetylene), Poly(dendron), Poly(macromonomer)

Polymer Synthesis

- Asymmetric-induced polymerization, Helix-sense-selective polymerization

Polymer reactions in membrane state

Membrane science

- Separation Membranes
Optical resolution membranes, Oxygen permselective membranes
Carbon dioxide permselective membranes, Ethanol permselective membranes

Education

1987: Doctoral Eng. degree, Nagoya University, Japan

1981: Bachelor Eng. degree, Nagoya University, Japan

Awards

Award for Encouragement of Research in Polymer Science; The Society of Polymer Science, Japan, 1989

Major Publications

Papers

Optical resolution membranes

[1] Enantioselective Permeability through Membranes from a Poly(substituted phenylacetylene) Having a Chiral Helical Backbone and Achiral Bidentate Ligands as Pendant Groups; Shingo Hadano, Masahiro Teraguchi, Takashi Kaneko, Toshiki Aoki, Chem.Lett., 36, 220, 2007

[2] Synthesis of Chiral Helical Poly (hydroxyl-containing phenylacetylene) Membranes by In-situ Depinanylsilylation and Their Enantioselective Permeabilities; Masahiro Teraguchi, Kazuomi Mottate, Sun-Young Kim, Toshiki Aoki, Takashi, Kaneko, Shingo Hadano, Toshio Masuda, Macromolecules, 38, 6367, 2005

[3] Enantioselective Permeation through Membranes of Chiral Helical Polymers Prepared by Depinanylsilylation of Poly(diphenylacetylene) with a High Content of the Pinanylsilyl Group, Masahiro Teraguchi, Jun-ichi Suzuki, Takashi Kaneko, Toshiki Aoki, and Toshio Masuda, Macromolecules, 36, 9694, 2003

[4] Synthesis and Properties of Polymers from Disubstituted Acetylenes with Chiral Pinanyl Groups, Toshiki Aoki, Yukie Kobayashi, Takashi Kaneko, Eizo Oikawa, Yasufumi Yamamura, Yoji Fujita, Masahiro Teraguchi, Roji Nomura, and Toshi Masuda, Macromolecules, 32(1), 79-85, 1999

Asymmetric polymerization

[1] Helix-Sense-Selective Polymerization of Achiral Bis(hydroxymethyl)phenylacetylenes Having an Alkyl Group of Different Lengths, Shingo Hadano, Takuya Kishimoto, Tomonori Hattori, Daisuke Tanioka, Masahiro Teraguchi, Toshiki Aoki*, Takashi Kaneko, Takeshi Namikoshi, Edy Marwanta, *Macromol. Chem. Phys.*, 210(9), 717, 2009

[2] Two Modes of Asymmetric Polymerization of Phenylacetylene Having a L-Valinol Residue and Two Hydroxy Groups, Hongge Jia, Masahiro Teraguchi, Toshiki Aoki, Yunosuke Abe, Takashi Kaneko, Shingo Hadano, Takeshi Namikoshi, Edy Marwanta, *Macromolecules*, 42, 17, 2009

[3] Helix-Sense Tunability Induced by Achiral Diene Ligands in the Chiral Catalytic System for the Helix-Sense-Selective Polymerization of Achiral and Bulky Phenylacetylene Monomers, Takashi Kaneko, Yasuhiro Umeda, Hongge Jia, Shingo Hadano, Masahiro Teraguchi, Toshiki Aoki, *Macromolecules*, 40, 7098.

[4] Assignment of Helical Sense for Poly(phenylacetylene) Bearing Achiral Galvinoxyl Chromophore Synthesized by Helix-Sense-Selective Polymerization, Takashi Kaneko, Yasuhiro Umeda, Tsuyoshi Yamamoto, Masahiro Teraguchi, Toshiki Aoki, *Macromolecules*, 38(23), 9420, 2005

[5] Helix-Sense-Selective Polymerization of Achiral Phenylacetylene Having Two Hydroxy Groups Using a Chiral Catalytic System, Toshiki Aoki, Takashi Kaneko, Naoki Maruyama, Atsushi Sumi, Masahiko Takahashi, Takashi Sato, and Masahiro Teraguchi, *J. Am. Chem. Soc.*, 125(21), 6346-6347, 2003

[6] Synthesis and Properties of Polymers from Disubstituted Acetylenes with Chiral Pinanyl Groups, Toshiki Aoki, Yukie Kobayashi, Takashi Kaneko, Eizo Oikawa, Yasufumi Yamamura, Yoji Fujita, Masahiro Teraguchi, Roji Nomura, and Toshi Masuda, *Macromolecules*, 32(1), 79-85, 1999

[7] Chiral Helical Conformation of Polyphenylacetylene Having Optically- Active Bulky Substituents, Toshiki Aoki, Masayuki Kokai, Ken-ichi Shinohara, and Eizo Oikawa, *Chem. Lett.*, 1993(12), 2009-2012

Polydendron

[1] Synthesis of poly(phenylacetylene)-based polydendrons consisting of a phenyleneethynylene repeating unit, and oxygen/nitrogen permeation behavior of their membranes, Takashi Kaneko, Kazuto Yamamoto, Motohiro Asano, Masahiro Teraguchi, Toshiki Aoki, *J. Membr. Sci.*, 278, 365, 2006

[2] Polydendron: Polymerization of Dendritic Phenylacetylene Monomers, Takashi Kaneko, Takahiro Horie, Motohiro Asano, Toshiki Aoki, and Eizo Oikawa, *Macromolecules*, 30(10), 3118-3121, 1997

Reviews

[1] Synthesis of functional π -conjugated polymers from aromatic acetylenes, Toshiki Aoki, Takashi Kaneko and Masahiro Teraguchi, *Polymer*, 47(14), 4867, 2006

[2] New Macromolecular Architectures for Permselective Membranes – Gas Permselective Membranes from Dendrimers and Enantioselectively Permeable Membranes from

One-handed Helical Polymers -, Toshiki Aoki and Takashi Kaneko, *Polym. J.*, 37(10), 717, 2005

[3] Macromolecular Design of Permselective Membrane, Toshiki Aoki, *Progress in Polymer Science*, 24, 951, 1999

