Takashi KANEKO, Ph.D.

Professor

Program: Advanced Materials Science and Technology

Area: Applied Chemistry and Chemical Engineering

Undergraduate: Dept. of Engineering

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Professional Expertise

His professional expertise is in polymer chemistry including synthesis of macromolecular architectures and functional polymers, especially asymmetric polymers and π-conjugated organic polyradicals for magnetic and electronic properties. He and his group have found new monomers and polymerization method such as helix-sense-selective polymerization of substituted acetylenes and found new π-conjugated polyradicals consisting of a ladderlike spin coupling network.

Research Fields of Interest

- Polymerization of dendritic macromonomers and molecular recognition property of the polydendrons as permselective membranes: Polymer chemistry, Functional material chemistry.
- Synthesis of π-conjugated polymers containing ladder-structure bearing stable radicals and their through-bond pseudo-2D-ferromagnetic interaction: Nano structural science, Polymer chemistry, Functional material chemistry.
- Synthesis of ferromagnetic π-conjugated polyradicals in combination with the optical properties: Nano structural science, Polymer chemistry, Functional material chemistry.
- Synthesis and magneto-optical properties of chiral polyradicals: Nano structural science, Polymer chemistry, Functional material chemistry.
- Synthesis of π-conjugated polyradical magnetic materials and their magnetochromism: Nano structural science, Polymer chemistry, Functional material chemistry.
- Nano-scale spin alignment for π-conjugated polymer materials and development for chiral polyradicals: Nano structural science, Polymer chemistry, Functional material chemistry.
- Magnetochemical memory of π-conjugated polyradical supramolecule / organic radicals inclusion compounds: Nano structural science, Polymer chemistry, Functional material chemistry.
- Synthesis of chiral π-conjugated polyradicals and their magnetic and magneto-optical properties: Polymer chemistry.
- Magnetic alignment induced by the well-designed nano-structure of chiral polyradicals and their magneto-optical property: Nano structural science, Polymer chemistry, Functional material chemistry.

Education

1995: Ph.D. in Engineering, Graduate School of Science and Engineering, Waseda University, Japan

1992: M.S. in Engineering, Graduate School of Science and Engineering, Waseda University, Japan

1990: B.S. in Engineering, Faculty of Science and Engineering, Waseda University, Japan

Professional Societies and Activities

1. The Society of Polymer Science, Japan
2. The Chemical Society of Japan
3. American Chemical Society

Awards

1. Award for Encouragement of Research in Polymer Science (the Society of Polymer Science, Japan), 2000

Major Publications

Papers

[1] "Synthesis of an Optically Active Poly(aryleneethynylene) Bearing Galvinoxyl Residues and Its Chiroptical and Magnetic Properties", *Synth. Met.*, vol.159, no.9-10, pp.864-867, 2009.

[2] "Optically Active Helical Structure and Magnetic Interaction of Poly(phenylacetylene)-based Polyradicals", *Polyhedron*, vol.28, no.9-10, pp.1927-1929, 2009.

[3] "Phenyleneethynylene Macrocycle-Fused Phenylacetylene Monomers: Synthesis and Polymerization", *Macromol. Chem. Phys.*, vol.210, no.1, pp.22-36, 2009.

[4] "Copper(I) Iodide Accelerates Catalytic Activation in Rhodium Complex-catalyzed Helix-sense-selective Polymerization of Achiral Phenylacetylene Monomers", *Chem.Lett.*, vol.37, no.4, pp.390-391, 2008.

[5] "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", *Macromolecules*, vol.40, no.20, pp.7098-7102, 2007.

[6] "Synthesis of an optically active helical poly (1,3-phenyleneethynylene) bearing stable radicals and its chiroptical and magnetic properties", *Polyhedron*, vol.26, no.9-11, pp.1825-1829, 2007.

[7] "Synthesis of functional p-conjugated polymers from aromatic acetylenes", *Polymer*, vol.47, no.14, pp.4867-4892, 2006.

[8] "Synthesis of poly(phenylacetylene)-based polydendrons consisting of a phenyleneethynylene repeating unit, and oxygen/nitrogen permeation behavior of their membranes", *J. Membr. Sci.*, vol.278, no.1-2, pp.365-372, 2006.

[9] "Assignment of Helical Sense for Poly(phenylacetylene) Bearing Achiral Galvinoxyl Chromophore Synthesized by Helix-Sense-Selective Polymerization", *Macromolecules*, vol.38, no.23, pp.9420-9426, 2005.

[10] "Synthesis and Magnetic Characterization of Monodisperse Oligo(9,10-anthryleneethynylene)-based Polyradicals with Two Pendant Stable Phenoxyls in One Anthracene Skeleton", *Polyhedron*, vol.24, no.16-17, pp.2544-2549, 2005.

[11] "New Macromolecular Architectures for Permselective Membranes -Gas Permselective Membranes from Dendrimers and Enantioselectively Permeable Membranes from One-handed Helical Polymers-", *Polymer J.*, vol.37, no.10, pp.717-735, 2005.

[12] "Helix-Sense-Selective Polymerization of a Phenylacetylene Bearing an Achiral and Bulky Galvinoxyl Moiety", *Chem.Lett.*, vol.34, no.6, pp.854-855, 2005.

[13] "Poly(9,10-anthryleneethynylene)-based Polyradicals with a Ladder-like Ferromagnetic Spin Coupling Network", *Polyhedron*, vol.22, no.14-17, pp.1845-1850, 2003.

[14] "Helix-Sense-Selective Polymerization of Phenylacetylene Having Two Hydroxy Groups Using a Chiral Catalytic System",
J. Am. Chem. Soc., vol.125, no.21, pp.6346-6347, 2003.

[15] "Ladder-like Ferromagnetic Spin Coupling Network on a π-Conjugated Pendant Polyradical", *J. Am. Chem. Soc.*, vol.125, no.12, pp.3554-3557, 2003.

[16] "Synthesis of a Pendant Polyradical with a New p-Conjugated Polymer Backbone Containing an Anthracene Skeleton and Its Ferromagnetic Spin Coupling", *Chem. Mater.*, vol.14, no.9, pp.3898-3906, 2002.

[17] "Polymerization of Phenylacetylene-Based Monodendrons and Structure of the Corresponding Polydendrons", *Polymer J.*, vol.33, no.11, pp.879-890, 2001.

[18] "Poly(9,10-anthryleneethynylene)-based Polyradicals with Pendant Phenoxyls", *Polyhedron*, vol.20, no.11-14, pp.1291-1296, 2001.

[19] "Synthesis of galvinoxyl unit-containing derivatives of poly(phenylacetylene) and polystyrene, and oxygen permeation behavior of their membranes", *Polymer*, vol.41, no.12, pp.4437-4444, 2000.

[20] "Synthesis of an Optically Active Poly(phenylacetylene) Bearing Galvinoxyl Radicals for Magnetic Materials", *Chem.Lett.*, vol.28, no.7, pp.623-624, 1999.

[21] "Polydendron: Polymerization of Dendritic Phenylacetylene Monomers", *Macromolecules*, vol.30, no.10, pp.3118-3121, 1997.

[22] "Poly(phenylenevinylene)-Attached Phenoxyl Radicals: Ferromagnetic Interaction through Planarized and π-Conjugated Skeleton", *J. Am. Chem. Soc.*, vol.118, no.40, pp.9695-9704, 1996.

[23] "Through-Bond Ferromagnetic Spin Alignment in a p-Conjugated Polyradical with a Poly(phenylenevinylene) Skeleton", *J. Am. Chem. Soc.*, vol.117, no.1, pp.548-549, 1995.

Book Chapters

[1] Nishide, H; Kaneko, T. 1999. "Pendant and π-Conjugated Organic Polyradicals", *Magnetic Properties of Organic Materials*, Lahti, P. M., Ed.; Marcel Dekker, Inc. pp.285-303.