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1. Highlights in 2009
1) Synthesis of hyperbranched polymers with controlled degree of branching  
A new class of a hyperbranched polymer with 100% degree of branching has been successfully prepared by using (1-(3-phenoxypropyl)piperidine-4-one as an AB2 monomer in the presence of methanesulfonic acid. A novel synthetic method of a hyperbranched polymer possessing 100% branching was successfully developed by using 3,3-dibromo-1-hexyl-5-hydroxyindolin-2-one as a monomer in the presence of sodium hydride.

2) Synthesis of thermally stable and high refractive index polymers  
Highly refractive and transparent polyimide (PI) containing a 3,4,8,9-tetrahydro-2,5,7,10-tetrathiaanthracene moiety in their main chains have been developed. The PI showed the highest refractive index, i.e., 1.769 at 633 nm in the PIs.

3) Proton exchange membranes for fuel cell application  
Sulfonated poly(ether sulfone)s containing binaphthyl units (BNSHs) were successfully prepared for fuel cell applications. BNSH-100 (IEC = 3.19 mequiv/g) showed excellent proton conductivity, which was comparable to or even higher than that of Nafion 117, over a range of 30-50% RH at 80 °C.

2. Articles  
Original articles  
1) Synthesis of a Hyperbranched Polymer with Perfect Branching Based on Piperidine-4-one  
W. Sinananwanich, T. Higashihara, M. Ueda

2) An Alkaline-Developable, Chemically Amplified, Negative-Type Photosensitive Poly(benzoxazole) Resist Based on Poly(o-hydroxy amide), an Active Ester-Type Cross-Linker, and a Photobase Generator  
K. Mizoguchi, T. Higashihara and M. Ueda

3) Locally and Densely Sulfonated Poly(ether sulfone)s as Proton Exchange Membrane  
Macromolecules, 2009, 42 (4), 1161-1166  
K. Matsumoto, T. Higashihara, M. Ueda

4) Synthesis and characterization of highly refractive polyimides derived from
2,7-bis(4′-aminophenylene sulfanyl)thianthrene-5,5,10,10-tetraoxide and aromatic dianhydrides
Polymer, 2009, 789-795
N-H You, Y. Suzuki, T. Higashihara, S. Ando, M. Ueda

5) Influence of Polymer Structure in Sulfonated Block Copoly(ether sulfone) Membranes for Fuel Cell Application
K. Nakabayashi, K. Matsumoto, T. Higashihara, M. Ueda

6) Synthesis and characterization of a novel coil–rod–coil triblock copolymers comprised of regioregular poly(3-hexylthiophene) and poly(methyl methacrylate) segments
T. Higashihara, M. Ueda

7) Direct patterning of poly(amic acid) and low-temperature imidization using a crosslinker, a photoacid generator, and a thermobase generator
T. Ogura, T. Higashihara, M. Ueda

8) Locally sulfonated poly(ether sulfone)s with highly sulfonated units as proton exchange membrane
K. Matsumoto, T. Higashihara, M. Ueda

9) An Alkaline-Developable, Negative-Working Photosensitive Polybenzoxazole Based on Poly(o-hydroxyamide), a Vinyl Sulfone-Type Cross-Linker, and a Novel Photobase Generator
Macromolecules, 2009, 42, 3780-3787
K. Mizoguchi, T. Higashihara, M. Ueda

10) Synthesis of Thermotropic Liquid Crystalline Polyimidest with Siloxane Linkages
Chem. Lett. 2009, 38, 716-717
Y. Shoji, T. Higashihara, J. Watanabe, M. Ueda

11) Synthesis of a novel water-soluble polyamide dendrimer based on a facile convergent method
K. Endo, Y. Ito, T. Higashihara, M. Ueda

12) Highly Refractive and Photosensitive Polyimide
Y. Saito, T. Higashihara, M. Ueda

13) Development of Photosensitive Poly(benzoxazole) based on a Poly(o-hydroxy amide), a Dissolution inhibitor, and a Photoacid Generator
T. Ogura, T. Higashihara, M. Ueda

14) Alkaline-developable, chemically amplified, negative-type photosensitive polyimide based on polyhydroxyimide, a crosslinker, and a photoacid generator
   Y. Saito, K. Mizoguchi, T. Higashihara, M. Ueda

15) Synthesis and Memory Device Characteristics of New Sulfur Donor Containing Polyimides.
   Macromolecules, 2009, 42(13), 4456-4463.
   N-H. You, C-C. Chueh, C-L. Liu, M. Ueda, W-C. Chen

16) Synthesis of High-Refractive Index Polyimide Containing Selenophene Unit
   N-H. You, N. Fukuzaki, Y. Suzuki, Y. Nakamura, T. Higashihara, S. Ando, M. Ueda

17) Synthesis of Highly Refractive Polyimides Derived from
   3,6-Bis(4-aminophenylene)sulfanyl)pyridazine and
   4,6-Bis(4-aminophenylencesulfanyl)pyrimidine

18) A Chemically Amplified, Negative-type Photosensitive Poly(phenylene ether ketone) (PEK) Resist Based on Ketal-protected PEK and a Photoacid Generator
   Chem. Lett. 38, 1048-1049
   Y. Saito, K. Matsumoto, T. Higashihara, M. Ueda

19) Sulfonated poly(ether sulfone)s with binaphthyl units as proton exchange membranes for fuel cell application
   K. Matsumoto, T. Nakagawa, T. Higashihara, M. Ueda

20) A Negative-Type Photosensitive Poly(3-hexylthiophene) with Cross-Linker and Photoacid Generator
   K. Endo, T. Ogura, T. Higashihara, M. Ueda

21) Synthesis of High Refractive Index Poly(thioether sulfone)s with High Abbe’s Number Derived from 2,5-Bis(sulfanylmethyl)-1,4-dithiane
   Y. Suzuki, T. Higashihara, S. Ando, M. Ueda

22) Sulfonated aromatic hydrocarbon polymers as proton exchange membranes for fuel cells
   Polymer, 50(23), 5341-5357 (2009).
   T. Higashihara, K. Matsumoto, M. Ueda,

23) All-conjugated diblock copolymer of poly(3-hexylthiophene)-block-
poly(3-phenoxyethylthiophene) for field-effect transistor and photovoltaic applications.

Organic Electronics, 10(8), 1541-1548 (2009)
C.-C. Chueh, T. Higashihara, J.-H. Tsai, M. Ueda, W.-C. Wen

24) Base-Catalyzed Synthesis of a 100% Hyperbranched Polymer on the Basis of an Indolin-2-one Unit
Macromolecules, 42 (22), 8718–8724 (2009)
W. Sinananwanich, Y. Segawa, T. Higashihara, M. Ueda

25) Living Anionic Polymerization of 4-Vinyltriphenylamine for Synthesis of Novel Block Copolymers Containing Low-Polydisperse Poly(4-vinyltriphenylamine) and Regioregular Poly(3-hexylthiophene) Segments
Macromolecules, 42 (22), 8794–8800 (2009)
T. Higashihara, M. Ueda

26) High refractive index polymers: fundamental research and practical Applications
J.-g. Liu, M. Ueda

27) Chemically Amplified Photosensitive Polyimides and Polybenzoxazoles
K. Fukukawa, M. Ueda

Review Article
1) Development of UV cured photosensitive polymers
Adhesion Technology 29, 1-7 (2009)
T. Hihashihara and M. Ueda

2) Condensation
T. Hihashihara and M. Ueda

4. Invited presentation in International/domestic conference

International conference
1) Tiwan-Japan Bilateral Polymer Symposium 4/22-24 2009 Taiwan
   Synthesis of a hyperbranched polymers with controlled degree of branching p-12
   M.Ueda

2) European Polymer Congress July 12-17 2009 Graz (Austria)
   Synthesis of a hyperbranched polymers with controlled degree of branching p-200
   M.Ueda W. Sinananwanich

3) Argentine-Chile Polymer Symposium October 19-21, 2009 Cordoba (Argentina)
Development of Highly Refractive Polymers for CMOS Image Sensor and Optical Materials.

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5. Patent

Total 26 (2009)