Yuya Doi

Personal Information

Assistant Professor
Department of Material Physics
Nagoya University

Address: Furo-cho, Chikusa-ku, Nagoya 4648603, Japan
E-mail: ydoi@mp.pse.nagoya-u.ac.jp
TEL: +81-(0)52-789-4202

Education

2011.3	B.S. from Dpt. Applied Chemistry, Engineering, Nagoya University
2013.3	M.S. from Dpt. Applied Chemistry, Engineering, Nagoya University
2016.3	Ph.D. from Dpt. Applied Chemistry, Engineering, Nagoya University Doctoral thesis: "Preparation and Characterization of Ring-based Polymers with Various Architectures and Their Viscoelastic Properties" (Supervisor: Prof. Yushu Matsushita)

Academic Career

2013.10－2014.1	Visiting Student, the University of Tennessee, US (Host: Prof. Jimmy W. Mays)
2014.4－2016.3	Research Fellow (DC2), Japan Society for the Promotion of Science
2016.4－2017.12	Program-Specific Assistant Professor, Institute for Chemical Research, Kyoto University (Supervisor: Prof. Hiroshi Watanabe)
2017.7－2017.9	Visiting Researcher, FORTH, Greece (Host: Prof. Dimitris Vlassopoulos)
2018.1－2019.6	Postdoctoral Researcher, Venture Business Laboratory, Nagoya University (Supervisor: Prof. Yushu Matsushita)
2019.7－2020.3	Postdoctoral Researcher, Forschungszentrum Jülich, Germany (Supervisor: Prof. Stephan Förster)
2020.3－present	Assistant Professor, Nagoya University (PI: Prof. Yuichi Masubuchi)

Research Areas

Polymer Physics:

1. Preparation, characterization and physical properties of model sheet-shaped polymers
2. Polymer dynamics and ion-conduction in novel solid polymer electrolytes
3. Non-equilibrium structure and dynamics of ring polymers under flow and elongation

Research Skills

Size-exclusion and interaction chromatography / NMR / Static- and dynamic-light scattering / Small-angle X-ray and neutron scattering / DSC / Rheology / Dielectric spectroscopy / Optical and electron microscopy / Neutron spin echo / Rouse model / Graph theory

Awards

2017.02 The 33th Inoue Research Award for Young Scientists

2014.12 The 10th SPSJ International Polymer Conference 2014 Young Scientist Poster Award

2013.05 The Society of Rheology, Japan, Best Presentation Award

Publications

Original Articles

1. F. Nakai, Y. Masubuchi, **Y. Doi**, T. Ishida, T. Uneyama, "Fluctuating Diffusivity Emerges even in Binary Gas Mixtures", *Phys. Rev. E*, accepted.

2. **Y. Doi**,* J. Allgaier, R. Zorn, S. Foerster, T. Egami, M. Ohl, "Relaxation Dynamics and Ion Conduction of Poly(Ethylene Carbonate/Ethylene Oxide) Copolymer-Based Electrolytes" *J. Phys. Chem. C* **2022**, *126(48)*, 20284-20292. DOI: 10.1021/acs.jpcc.2c06941

3. R. Ushiroguchi, R. Suizu, Y. Matsunaga, H. Omachi, **Y. Doi**, Y. Masubuchi, S. Bandow, K. Awaga, "CNT Gels Formed by a Triptycene Analogue Enabling Coexistence of CNT-Gelator and Intergelator Interactions", *Chem. Lett*. **2022**, *51(11)*, 1070-1073. DOI: 10.1007/s00397-022-01365-w

4. **Y. Doi**,* J. Kitamura, T. Uneyama, Y. Masubuchi, A. Takano, Y. Takahashi, Y. Matsushita, "Viscoelastic Properties of Comb-Shaped Ring Polystyrenes" *Polymer Journal* **2022**, accepted. [Special issue article for *Rising Stars 2022 in Polymer Journal*]

5. **Y. Doi**,* A Takano, Y. Takahashi, Y. Matsushita, "Terminal Relaxation Behavior of Entangled Linear Polymers Blended with Ring and Dumbbell-Shaped Polymers in Melts", *Rheol Acta* **2022**, accepted. DOI: 10.1007/s00397-022-01355-y [Invited special early career issue on "Trends and Progress in Rheology"]

6. K. Aoki, A. Sugawara-Narutaki, **Y. Doi**, R. Takahashi, "Structure and Rheology of Poly(Vinylidene Difluoro-*co*-Hexafluoropropylene) in an Ionic Liquids: the Solvent Behaves as a Weak Cross-Linker Through Ion-Dipole Interactions", *Macromolecules* **2022**, accepted. DOI: 10.1021/acs.macromol.2c00485

7. Y. Masubuchi, R. Yamazaki, **Y. Doi**, T. Uneyama, N. Sakumichi, T. Sakai, "Brownian Simulations for Tetra-Gel-Type Phantom Networks Composed of Prepolymers with Bidispersed Arm Length", *Soft Matter* **2022**, accepted. DOI: 10.1039/D2SM00488G [Invited article]

8. T. Uneyama, T. Oishi, T. Ishida, **Y. Doi**, Y. Masubuchi, "Stress Tensor of Single Rigid Dumbbell by Virtual Work Method", *Nihon Reoroji Gakk. (J. Soc. Rheol. Jpn.)* **2022**, accepted.

9. Y. Masubuchi, L. Yang, T. Uneyama, **Y. Doi**, "Primitive Chain Network Simulations for Shear Rheology of Poly(propylene carbonate) Melts", *Nihon Reoroji Gakk. (J. Soc. Rheol. Jpn.)* **2022**, accepted.

10. Y. Masubuchi, **Y. Doi**, T. Uneyama, "Effects of Slip-Spring Parameters and Rouse Bead Density on Polymer Dynamics in Multichain Slip-Spring Simulations", *J. Phys. Cham. B* **2022**, 126(15), 2930-2941. DOI: 10.1021/acs.jpcb.2c00697 [Special issue for Doros N. Theodorou Festschrift]

11. Y. Masubuchi, L. Yang, T. Uneyama, **Y. Doi**, "Analysis of Elongational Viscosity of Entangled Poly(Propylene Carbonate) Melts by Primitive Chain Network Simulations", *Polymers (MDPI)* **2022**, *14(4)*, 741(1-12). DOI: 10.3390/polym14040741 [Special issue according to the invitation from Prof. Theodorou and Prof. Mavranzas]

12. L. Yang, T. Uneyama and Y. Masubuchi, **Y. Doi**,* "Nonlinear Shear and Elongational Rheology of Poly(propylene carbonate)", *Nihon Reoroji Gakk. (J. Soc. Rheol., Jpn.)* **2022**, *50(1)*, 127-135. DOI: 10.1678/rheology.50.127

13. Y. Masubuchi, T. Kida, **Y. Doi** and T. Uneyama, "Radial Distribution Functions of Entanglements in Primitive Chain Network Simulations", *Nihon Reoroji Gakk. (J. Soc. Rheol. Jpn.)* **2021**, *49(5)*, 337-345. DOI: 10.1678/rheology.49.337

14. L. Yang, T. Uneyama and Y. Masubuchi, **Y. Doi**,* "Linear Rheological Properties of Poly(Propylene Carbonate) with Different Molecular Weights", *Nihon Reoroji Gakk. (J. Soc. Rheol., Jpn.)* **2021**, *49(4)*, 267-274. DOI: 10.1678/rheology.49.267

15. T. Kida, **Y. Doi**, R. Tanaka, T. Uneyama, T. Shiono, Y. Masubuchi, "Rheological Properties of Linear and Short-Chain Branched Polyethylene with Nearly Monodispersed Molecular Weight Distribution", *Rheol. Acta.* **2021**, *60(9)*, 511-519. DOI: 10.1007/s00397-021-01286-0

16. **Y. Doi**,* A. Takano, Y. Matsushita, "Preparation and Distorted Cylindrical Morphology of Block Copolymers Consisting of Flexible and Semiflexible Blocks", *Polym. J.* **2021**, *53(12)*, 1361-1369. DOI: 10.1038/s41428-021-00530-x

17. **Y. Doi**,* A Takano, Y. Takahashi, Y. Matsushita, "Viscoelastic Properties of Dumbbell-Shaped Polystyrenes in Bulk and Solution", *Macromolecules* **2021**, *54(3)*, 1366-1374. DOI: 10.1021/acs.macromol.0c02050

18. **Y. Doi**,* A Takano, Y. Takahashi, Y. Matsushita, "Melt Rheology of Tadpole-Shaped Polystyrenes with Different Ring Sizes", *Soft Matter* **2020**, *16(37)*, 8720-8724. DOI: 10.1039/D0SM01098G

19. Y. Masubuchi, **Y. Doi**, T. Uneyama, "Primitive Chain Network Simulations for the Interrupted Shear Response of Entangled Polymeric Liquids", *Soft Matter* **2020**, *16(28)*, 6554-6661. DOI: 10.1039/D0SM00654H

20. T. Noda, **Y. Doi**,* Y. Ohta, S. Takata, A. Takano, Y. Matsushita, "Preparation, Characterization and Dilute Solution Properties of Four-Branched Cage-Shaped Poly(Ethylene Oxide)", *J. Polym. Sci.* **2020**, *58(15)*, 2098-2107. DOI: 10.1002/pol.20200286

21. T. Iwamoto,[&] **Y. Doi**,[&] K. Kinoshita, A. Takano, Y. Takahashi, E. Kim, T. H. Kim, S. Takata, M. Nagao, Y. Matsushita, "Conformations of Ring Polystyrenes in Semidilute Solutions and in Linear Polymer Matrices Studied by SANS", *Macromolecules* **2018**, *51(17)*, 6836-6847. DOI: 10.1021/acs.macromol.8b00934

22. Y. Kobayashi, **Y. Doi**, S. S. A. Rahman, E. Kim, T. H. Kim, A. Takano, Y. Matsushita, "SANS Study of Ring Topology Effects on the Miscibility of Polymer Blends", *Macromolecules* **2018**, *51(5)*, 1885-1893. DOI: 10.1021/acs.macromol.7b02359

23. T. Iwamoto, **Y. Doi**, K. Kinoshita, Y. Ohta, A. Takano, Y. Takahashi, M. Nagao, Y. Matsushita, "Conformations of Ring Polystyrenes in Bulk Studied by SANS", *Macromolecules* **2018**, *51(4)*, 1539-1548. DOI: 10.1021/acs.macromol.7b02358

24. **Y. Doi**, A. Matsumoto, T. Inoue, T. Iwamoto, A. Takano, Y. Matsushita, Y. Takahashi, H. Watanabe, "Re-Examination of Terminal Relaxation Behavior for High Molecular Weight Ring Polystyrene Melts", *Rheol. Acta* **2017**, *56(6)*, 567-581. DOI: 10.1007/s00397-017-1014-3

25. **Y. Doi**, A. Takano, Y. Matsushita, "Synthesis and Characterization of Dumbbell-Shaped Polystyrene", *Polymer* **2016**, *106*, 8-13. DOI: 10.1016/j.polymer.2016.10.037

26. **Y. Doi**, Y. Iwasa, K. Watanabe, M. Nakamura, A. Takano, Y. Takahashi, Y. Matsushita, "Synthesis and Characterization of Comb-Shaped Ring Polystyrenes", *Macromolecules* **2016**, *49(8)*, 3109-3115. DOI: 10.1021/acs.macromol.6b00208

27. **Y. Doi**, A Takano, Y. Takahashi, Y. Matsushita, "Melt Rheology of Tadpole-shaped Polystyrenes", *Macromolecules* **2015**, *48(23)*, 8667-8674. DOI: 10.1021/acs.macromol.5b01913 (*Selected as Cover Art*)

28. **Y. Doi**, K. Matsubara, Y. Ohta, T. Nakano, D. Kawaguchi, Y. Takahashi, A. Takano, Y. Matsushita, "Melt Rheology of Ring Polystyrenes with Ultrahigh Purity", *Macromolecules* **2015**, *48(9)*, 3140-3147. DOI: 10.1021/acs.macromol.5b00076 (*Selected as ACS Editors' Choice*)

29. **Y. Doi**, Y. Ohta, M. Nakamura, A. Takano, Y. Takahashi, Y. Matsushita, "Precise Synthesis and Characterization of Tadpole-Shaped Polystyrenes with High Purity", *Macromolecules* **2013**, *46(3)*, 1075-1081. DOI: 10.1021/ma302511j

Books, Reviews and Tutorials

1. **Y. Doi**,* "Rheological Properties of Ring Polymers and Their Derivatives", *Nihon Reoroji Gakk. (J. Soc. Rheol., Jpn.)* **2022**, *50(1)*, 57-62. DOI: 10.1678/rheology.50.57 [Invited Review Article for Special Issue to Commemorate Reaching Volume 50]

2. Y. Masubuchi, **Y. Doi**, T. Uneyama, "Entanglement Molecular Weight", *Nihon Reoroji Gakk. (J. Soc. Rheol. Jpn.)* **2020**, *48(4)*, 177-183. DOI: 10.1678/rheology.48.177 [Review Article]

3. **Y. Doi**, A. Takahashi, Y. Takahashi, Y. Matsushita, "Physical Properties of Ring Polymers and Their Derivatives", *Kobunshi* **2017**, *66*, 229-232. [Tutorial in Japanese]

Miscellaneous

1. Y. Masubuchi, **Y. Doi**, T. Kida, T. Uneyama, "Research Group for Rheology Physics, Department of Materials Physics, Nagoya University", *Nihon Reoroji Gakk. (J. Soc. Rheol., Jpn.)* **2021**, *49(1)*, 49-51.

2. **Y. Doi**, T. Uneyama, M. Hayashi, S. Nobukawa and Y. Masubuchi, "Conference Report for the 14th International Workshop for East Asian Young Rheologists (IWEAYR-14) in Nagoya", *Nihon Reoroji Gakk. (J. Soc. Rheol., Jpn.)* **2019**, *47(3)*, 123-125.

Invited Talks & Seminars *(International)*

1. **Y. Doi**, "Structure and dynamics of ring polymers and their derivatives", IESL Seminar at FORTH, Crete, Greece, Feb. 10, 2020. [Seminar]

2. **Y. Doi**, "Structure and dynamics of ring polymers and their derivatives", ICMN Seminar at University of Orleans, Orleans, France, Jan. 20, 2020. [Seminar]

3. **Y. Doi**, "Ring topology effect on the miscibility of polymer blends", International Symposium "Polymers Meet Topology", D2-14:30, Tokyo, Japan, Jan. 31, 2019. (Young-Scientist Invited)