Nanomaterials and Polymer Chemistry Lab


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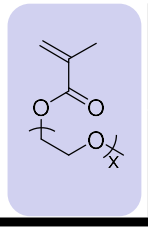
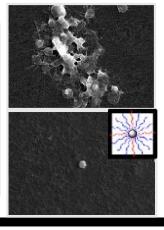
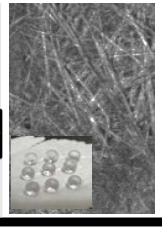
【Greetings】Based on the concept of "molecular technology" and "precise polymerization", we create **biomaterial**, **energy** related materials, and **environmentally** friendly materials, using polymer chemistry. We cooperate **companies** for actual application. We contribute to society by development of **human resources**. In order to achieve that, I do my best by frequent discussion with members and by conveying approaches and challenging spirits. (Jan. 2024)

Control of Polymer Structure

Precise polymerization, **flow system**, and **material processing** are utilized in order to create the novel polymer structure and material

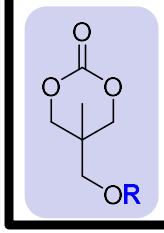
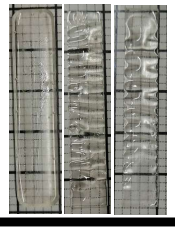
For example, star- and cage-shaped polymers, as well as narrow PDI, by living radical polymerization, well-defined and cyclic polymers by development of novel polymerization methods, and non-woven fabric with low molecular weight compounds by electrospinning process method.

Degradable Polymer

Molecular design of the novel monomers contribute to medical and environment.

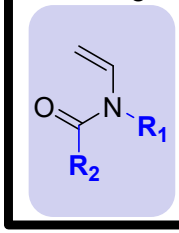
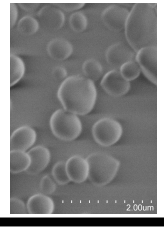
For example, medical materials, long-term drug release, and environmentally friendly polymers are created by poly(trimethylene carbonate derivative)s with ester free structure, polylactides with chain end modification, and chemically modified poly(butylene succinate) with double bond in the main chain.


High Performance Polymer

For the **alternative of general polymers**, new amphiphilic polymers and natural polymers are utilized to control mechanical strength or thermal properties.

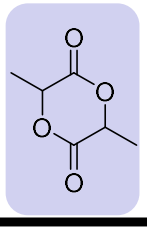
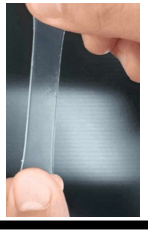
For example, molecular weight and particle control by *N*–vinylamide, flexible materials, resin altenative, antifouling surfaces, and surface control by chitin, cellulose, agarose are designed and prepared.


Novel Functional Polymer

Molecular technology concept contribute to the creation of next-generation functional materials.

For example, water-harvesting, surface-covered, highly-stretching, and water-retaining materials by functional hydrogels, thermal storage by nanofilm coating, and novel functional materials by stereocomplex are created.


<Achievement in 2023> Original papers: (1) J. Choi, H. Ajiro, *Macromol. Chem. Phys*. in press. (2) R. Miyake, H. Ajiro, *Polym. J.* in press. (3) M.A. Kelland, E.G. Dirdal, J. Pomicpic, H. Ajiro, A. Nag, *Energ. Fuel*, **2023**, *37*, 11853. (4) M.A. Kelland, E.G. Dirdal, R. Ghosh, H. Ajiro, *ACS Omega*, **2023**, *8*, 28859. (5) S. Shimizu, H. Yoshida, K. Mayumi, H. Ajiro, Y. Sagara, *Mater. Chem. Front.* **2023**, *7*, 4073. (6) S. Takasuka, S. Oikawa, T. Yoshimura, S. Ito, Y. Harashima, T. Takayama, S. Asano, A. Kurosawa, T. Sugawara, M. Hatanaka, T. Miyao, T. Matsubara, Y. Ohnishi, H. Ajiro, M. Fujii, *Digital Discovery*, **2023**, *2*, 809. (7) A. Wakiuchi, S. Jasial, S. Asano, R. Hashizume, M. Hatanaka, Y. Ohnishi, T. Matsubara, H. Ajiro, T. Sugawara, M. Fujii, T. Miyao, *ACS Omega*, **2023**, *8*, 19781. (8) A. Wakiuchi, S. Takasuka, S. Asano, R. Hashizume, A. Nag, M. Hatanaka, T. Miyao, Y. Ohnishi, T. Matsubara, T. Ando, T. Sugawara, M. Fujii, H. Ajiro, *Macromol. Mater. Eng.* **2023**, *308*, 2200626. (9) T. Akagi, T. Yamada, H. Miyazaki, H. Taguchi, H. Ikeda, M. Katoh, S. Mura, P. Couvreur, P. Chetprayoon, R. Maniratanachote, H. Yoshida, H. Ajiro, K. Hashimoto, T. Ashikaga, H. Kojima, M. Akashi, *J. Appl. Toxicol.* **2023**, *43*, 874. (10) N. Chanthaset, A. Maehara, H. Ajiro, *Colloids Surf. A*. **2023**, *667*, 131413. (11) L.Y. Tan, N. Chanthaset, A. Fadlan, H. Ajiro, *React. Funct. Polym*. **2023**, *186*, 105563. (12) N. Murase, H. Kurioka, C. Komura, H. Ajiro, T. Ando, *Soft Matter*, **2023**, *19*, 2330. (13) K. Sarisuta, M. Iwami, B. Martin-Vaca, N. Chanthaset, H. Ajiro, *Langmuir*, **2023**, *39*, 3994. (14) T. Ando, K. Yamaguchi, H. Ajiro, *Polym. Chem*. **2023**, *14*, 1027. (15) M. Palenzuela, K. Sarisuta, M. Navarro, N. Kumamoto, N. Chanthaset, J. Monot, H. Ajiro, B. MARTIN-VACA, D. Bourissou, *Macromolecules*, **2023**, *56*, 678. (16) R. Kawatani, T. Hamawaki, T. Waku, N. Tanaka, H. Ajiro, *Macromol. Chem. Phys*. **2023**, 2200386. (17) I. Kurowska, A.D. Demorsy, S. Balayssac, M. Hennetier, A. Ric, V. Bourdon, T. Ando, H. Ajiro, O. Coutelier, M. Destarac, *Macromol. Rapid Commun.* **2023**, 2200729.**Patent application**:[1]浅野重人、菅原哲徳、大西裕也、脇内新樹、藤井幹也、網代広治, 特願2023-006716. **Invited lectures**: 4. **Conference presentation**: 57(Poster 34、Oral23件).