

# 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 **environmental** 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. 2022)

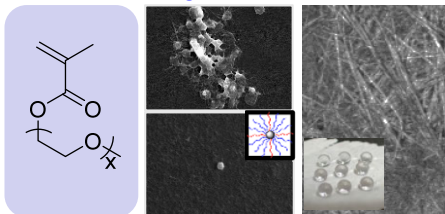


Staff 4, Secretary 1, Technical 2, D3: 2, D1: 2,  
M2: 7, M1: 7, Researcher: 2 ※Include fall students.

## 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.

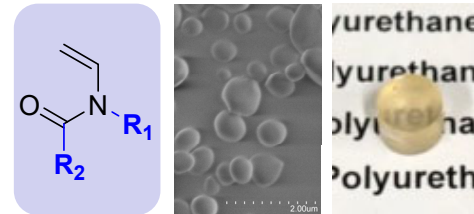
For example, medical materials for **circular organs, long-term release**, and **environmentally friendly polymers** are created by **poly(trimethylene carbonate derivative)s** with ester free structure, **polylactides** with chain end modification, and chemically modified **poly(butylene succinate)** 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.

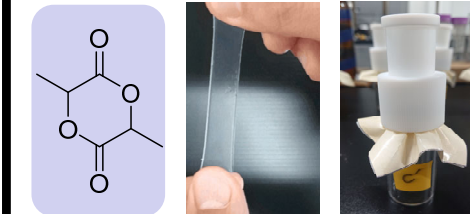
For example, **molecular weight and particle control** by **N-vinylamide**, **flexible materials, resin alternative, antifouling surfaces, and surface control** by **chitin, cellulose, agarose** are designed and prepared.



## 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 2021> Original papers:** (1) S. Asano, J. Choi, T.T. Tran, N. Chanthaset, H. Ajiro, *Polym. Adv. Technol.* in press. (2) J. Choi, H. Ajiro, *Polym. J.* in press. (3) J. Choi, M.A. Kelland, H. Furumai, Y. Miyaji, Y. Nakai, M. Fukushima, H. Ajiro, *Polym. Bull.* in press. (4) I. Yamamoto, S. Minami, T. Ando, H. Ajiro, *Polym. Bull.* in press. (5) D. Aoki, A. Miyake, W. Tachaboonyakiat, H. Ajiro, *RSC Adv.* **2021**, *11*, 35607. (6) R. Fujiwara, R. Sanuki, H. Ajiro, T. Fukui, S. Yoshida, *Sci. Rep.* **2021**, *11*, 19991. (7) H. Nobuoka, R. Miyake, J. Choi, H. Yoshida, N. Chanthaset, H. Ajiro, *Eur. Polym. J.* **2021**, *160*, 110782. (8) L.Y. Tan, N. Chanthaset, S. Nanto, R. Soba, M. Nagasawa, H. Ohno, H. Ajiro, *Macromolecules* **2021**, *54*, 5518. (9) J. Choi, T. Takata, H. Ajiro, *Macromolecules* **2021**, *54*, 5087. (10) D. Aoki, H. Ajiro, *Macromol. Rapid Commun.*, **2021**, *42*, 2100128. (11) K. Irikura, N. Ekapakul, C. Choochottiros, N. Chanthaset, H. Yoshida, H. Ajiro, *Polym. J.* **2021**, *53*, 823. (12) D. Aoki, H. Ajiro, *Polym. Chem.* **2021**, *12*, 1533. (13) S. Seitz, M. Tsujimoto, N. Chanthaset, H. Yoshida, H. Ajiro, *J. Appl. Polym. Sci.* **2021**, *138*, 50202. **Patent application:** [1] 網代広治, ナリンティップ, 生川詩奈, 特願2021-187319. [2] 網代広治, ナリンティップ, チャタセ, 松本隆将, 牧田健一, 特願2021-082645. [3] 網代広治, 吉田裕安材, 古舞博也, 特願2021-079379. **Invited lecture and seminars:** 4. **Conference presentation:** 24 (Poster 8, Oral 16). **Award:** 1 (Student 1).