

Division of Materials Chemistry

– Polymer Controlled Synthesis –



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Scope of Research

Our research focuses on creation of new organic molecules with potential as key reagents and materials for future science and technologies. Furthermore, we have been developing new organic and polymeric materials based on our tailor-made molecules. For example, we are developing a new living radical polymerization method using heavier heteroatom compounds as controlling agents. Another topic is the synthesis of cycloparaphenylenes, hoop-shaped π -conjugated molecules, based on new synthetic strategies. We also study various condensed states of polymers by both static and dynamic methods to understand the relationship between structure and physical properties.

KEYWORDS

Organic Synthesis
Living Radical Polymerization
Curved π -Conjugated Molecules

Polymer Synthesis
Polymer Properties



Recent Selected Publications

Tong, T.; Kibune, M.; Tosaka, M.; Matsumiya, Y.; Watanabe, H.; Yamago, S., Melt Rheology of Dendritic Hyperbranched Polyacrylates Synthesized by Controlled Radical Polymerization: Evidence of Self-Similar Branch Structure Formation, *J. Am. Chem. Soc.*, **147**(29), 25652-25661 (2025).

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Kayahara, E.; Okahara, R.; Shibata, A.; Abe, M.; Yamago, S., Synthesis and Physical Properties of $[n]$ Cycloparaphenylene Ketone ($n = 6, 7, 8$, and 10), *Angew. Chem. Int. Ed.*, **64**(33), e202509754 (2025).

Kayahara, E.; Hirata, S.; Mizuhata, Y.; Yasuda, Y.; Kusakabe, Y.; Kaji, H.; Yamago, S., Synthesis of π -Extended [1.1]Paracyclophanes, [1.1] $[n]$ PCP ($n = 2, 3$, and 4), and Their Through-Space Conjugation, *Chem. Eur. J.*, **31**(1), e202402225 (2025).

Yamin, N.; Tosaka, M.; Yamago, S., Elucidation of the Termination Mechanism of the Radical Polymerization of Isoprene, *Macromolecules*, **58**(9), 4665-4672 (2025).