Prof. Michinori Suginome

~ Kyoto University - JAPAN ~

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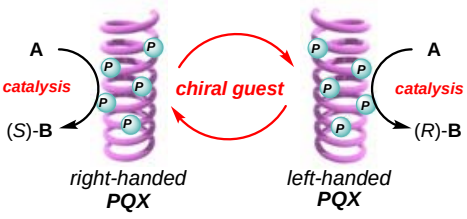
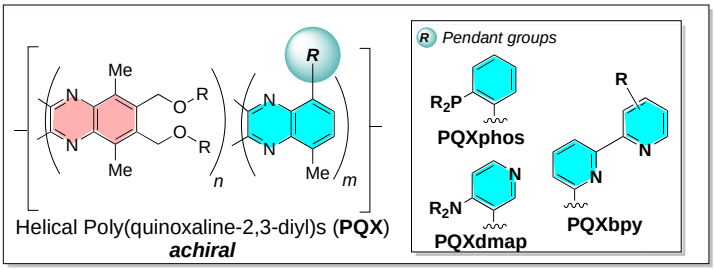
Salle Marie Curie

Chirality-Switchable/Amplifiable Catalysts for Asymmetric Synthesis

Increasing interest is focused on the dynamic nature of the chirality of catalysts, which would allow switch of enantioselection, chirality transfer from chiral guest molecules, and amplification of chirality in catalytic asymmetric synthesis. It is therefore highly important to find new molecular scaffolds that allow dynamic creation of chiral reaction environment. In this presentation, molecular design, dynamic chirality, and performance of new helical-polymer-based chiral catalysts are discussed. Poly(quinoxaline-2,3-diyl)s (PQXs) bearing monophosphine (**PQXphos**),[1] 2,2'-bipyridyl (**PQXbpy**),[2] and 4-aminopyridine-3-yl (**PQXdmap**)[3] pendants show high enantioselectivities, high reusability, and high catalyst activity in several different transition-metal-catalyzed and organocatalytic reactions. Particular focus of this presentation is on the induction of single-handed helical conformation to PQXs that do not possess any chiral substituents by external chiral sources.[4] Using this mechanism of helix induction, asymmetric catalysis in which external chiral molecules serves as sources of chirality has been achieved.[5] This feature could be successfully applied to new catalytic systems where enantiopurity of the exrternal chiral sources are effectively amplified through asymmetric catalysis.[4,6]





References

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2) Yoshinaga, Y.; Yamamoto, T.; Suginome, M., *ACS Macro Lett.*, **2017**, *6*, 705.
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4) Yamamoto, T.; Murakami, R.; Komatsu, S.; Suginome, M., *J. Am. Chem. Soc.* **2018**, *140*, 3867.

5) Nagata, Y.; Yamada, T.; Adachi, T.; Akai, Y.; Yamamoto, T.; Suginome, M., *J. Am. Chem. Soc.* **2013**, *135*, 10104; Nagata, Y.; Nishikawa, T.; Suginome, M., *J. Am. Chem. Soc*., **2014**, *136,* 15901; Nagata, Y.; Nishikawa, T.; Suginome, M.; Sato, S.; Sugiyama, M.; Porcar, L.; Anne, M.; Inoue, R.; Sato, N., *J. Am. Chem. Soc.* **2018**, *140*, 2722.
6) Ke, Y.-Z.; Nagata, Y.; Yamada, T.; Suginome, M., *Angew Chem., Int. Ed.* **2015**, 54, 9333.

Research interests

In the Suginome group, a variety of research projects are pursued on the basis of synthetic organic chemistry, organometallic chemistry, main group metal chemistry, transition metal chemistry, polymer chemistry, asymmetric synthesis, etc. The group always try to pursue innovative molecular and reaction design for establishing new synthetic methods, new molecular functions, new concept, new phenomena, new principles, etc. The Suginome group is interested in development of new catalytic reactions for molecular synthesis, utilizing transition metal catalysts and organosemimetallic reagents. Boron and silicon are particularly interesting, serving as key elements in our chemistry. The Suginome group is also interested in the synthesis and new molecular functions of single-handed helical polymers, particularly poly(quinoxaline-2,3-diyl)s.

- ✓ http://www.sbchem.kyoto-u.ac.jp/suginome-lab/index.php?Home
- ✓ ~ 200 publications

Contact : sylvain.collet@univ-nantes.fr