

Helical Polymers: Synthesis, Structure, and Function

Eiji Yashima*

Department of Chemical Engineering, National Tsing Hua University,

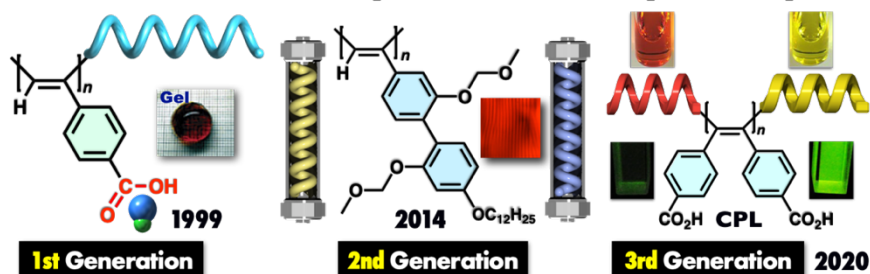
Hsinchu 300044, Taiwan and Nagoya University, Nagoya, Japan

E-mail: yashima@gapp.nthu.edu.tw, yashima@chembio.nagoya-u.ac.jp

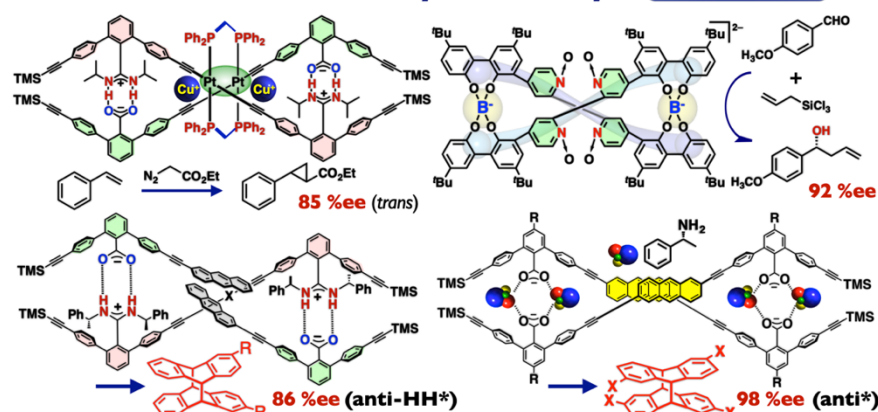
In polymer and supramolecular chemistry, the control of helicity and its handedness remain an attractive challenge because of potential applications in chiral materials science [1]. Here we present unique polymers that fold into either a right- or left-handed helical conformation induced by noncovalent chiral interactions followed by dynamic or static helicity memory, which provide novel switchable chiral materials for chromatographic

enantioseparation, asymmetric catalysis and chiral sensor [2,3]. A series of double helices composed of different components and sequences that exhibit specific functions, such as chiral recognition, enantioselective asymmetric catalysis and anisotropic spring-like motion are also briefly described [4].

Functional Helical Polymers with Helicity Memory



Double Helical Framework for Asymmetric Catalysis Proof-of-concept



References

- [1] Reviews: Yashima E.; Ikai T.; Maeda K. *et al.*, *Chem. Rev.* **2016**, *116*, 13752; Yashima E. *Proc. Jpn. Acad., Ser. B*, **2023**, *99*, 438.
- [2] Ikai T.; Yashima E. *et al.*, *Angew. Chem., Int. Ed.* **2024**, *63*, e202412752; *Angew. Chem., Int. Ed.* **2024**, *63*, e202318712. Maeda K.; Yashima E. *et al.*, *Angew. Chem., Int. Ed.* **2023**, *62*, e202217020. Ikai T.; Yashima E. *et al.*, *Angew. Chem., Int. Ed.* **2023**, *62*, e202301127. Ikai T.; Yashima E. *et al.*, *Angew. Chem., Int. Ed.* **2023**, *62*, e202306252. Ikai T.; Yashima E. *et al.*, *J. Am. Chem. Soc.* **2023**, *145*, 24862. Maeda K.; Yashima E. *et al.*, *Nature Chem.* **2014**, *6*, 429. Yashima, E. *et al.*, *Nature* **1999**, *399*, 449.
- [3] Maeda K.; Yashima E. *et al.*, *J. Am. Chem. Soc.* **2020**, *142*, 7668. Maeda K.; Yashima E. *et al.*, *Sci. Adv.* **2021**, *7*, eabg5381.
- [4] Yashima E., Furusho, Y. *et al.*, *Acc. Chem. Res.* **2008**, *41*, 1166; *Angew. Chem., Int. Ed.* **2020**, *59*, 7478; *Nat. Commun.* **2019**, *10*, 1457; *Nature Chem.* **2010**, *2*, 444.