【Science and engineering（Chemistry）】

Development of Materials with Novel Properties and Functions Based on Controlled Double-Stranded Helical Structure

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【Outline of survey】

Biological polymers, such as proteins and nucleic acids, possess a characteristic single-handed α-helix and double-helix, respectively, which typically links to their sophisticated functions in living systems. Inspired by such exquisite helical structures, the design and synthesis of artificial helical polymers and oligomers with a controlled helix-sense has been attracting considerable interest in the past two decades in polymer and supramolecular chemistry. While a number of synthetic polymers and oligomers that fold into a single-stranded helical conformation have been reported, only a few structural motifs have been available for constructing double-stranded helical structures. In this research project, a variety of double- and multi-stranded helical polymers and oligomers will be designed and synthesized in order to develop functional materials with novel properties due to the double-stranded helical structure and chirality.

【Expected results】

This research project is aiming to create a variety of double-and multi-stranded helical polymers and oligomers with potential property and functionality involving molecular recognition (discrimination), catalytic activity (catalyst), and self-replication or information storage with implications for biological helicity, superstructures, and their sophisticated functions. Double-stranded helical polymers and oligomers with optical activity due to their one-handed helicity will show unique liquid crystallinity and can be used as chiral materials for separating enantiomers and for preparing single enantiomers as asymmetric catalysts.

【References by the principal investigator】

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- Y. Tanaka, H. Katagiri, Y. Furusho, and E. Yashima, A Modular Strategy to Artificial Double Helices**,** *Angew. Chem., Int. Ed.*, **44**, 3867-3870 (2005).

【Term of project】 FY2008− 2012	【Budget allocation】 **88,900,000 yen** (direct cost)

【Homepage address】 http://helix.mol.nagoya-u.ac.jp