

Design of Chiral Molecular Catalysts and the Development of Precision Polymerization Processes using them

Project Leader

SUGIMOTO Ryuichi, Dr. Eng.

Professor, Environmental Systems Engineering Course

Objective

Chiral molecular catalysts are effective asymmetric catalysts for asymmetric synthesis and stereospecific or regioselective polymerization, and contribute to efficient production of chemicals and materials.

For example chiral "salen"-metal complexes have been found to act as highly enantioselective catalysts for asymmetric epoxidation, asymmetric hydroxylation and other high enantioselective synthetic reactions.

However, salen metal complexes are not so efficient for stereospecific or regioselective polymerization processes. Meanwhile β -Diketiminato Ligands, which are mono-anionic bidentate ligands, have been utilized in the synthesis of a wide variety of transition metal and main group element complexes.

In the present project, we will develop new chiral metal complexes having β -Diketiminato as their basic structure and will examine their application to stereospecific or regioselective polymerization processes.

Project Outline

(1) Development of New Chiral Metal Complexes

There are various synthetic routes to the β -diketiminato ligand, either as its conjugate acid or as a metal complex. This ligand is obviously of great interest, considering the scope for variation of the substitutional groups on nitrogen, which may be hydrogen or alkyl, aryl, or silyl groups. The substitutional groups can also be linked to form either neighboring fused six-membered or five-membered heterocyclic rings.

From this viewpoint, we will attempt to develop new chiral metal complexes having β -Diketiminato as basic structure.

(2) Development of a stereospecific or regioselective polymerization process.

Chiral metal complexes having β -Diketiminato are relatively stable under normal conditions.

Therefore we can use many kinds of monomers, such as polar and non-polar monomers, for the polymerization. In this project we will study processes for stereospecific or regioselective polymerization of various kinds of monomers using chiral metal complexes having β -Diketiminato for the production of value-added polymer materials.

References

(1) Gibson, V. C.; Newton, C.; Redshaw, C.; Solan, G. A.; White, A.J. P.; Williams, D. J. *Eur. J. Inorg. Chem.* **2001**, 1895

(2) Chamberlain, B. M.; Cheng, M.; Moore, D. R.; Ovitt, T. M.; Lobkovsky, E. B.; Coates, G. W. *J. Am. Chem. Soc.* **2001**, *123*,3229.

Contact

E-mail: sugimoto.ryuichi@kochi-tech.ac.jp