Science and Technology

Tailor-made Catalytic Development

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Background of Research

Many of the medicinal products today have a very complex structure in order to have a highly selective medicinal effect. We are carrying out our research aiming at developing catalysts which can freely synthesize compounds having such a complex structure.

Achievements of Research

For example, we are developing a quick analytic system in which "solid phase asymmetric catalytic reaction" and " circular dichroism (CD)" are combined in order to efficiently promote the search of asymmetric catalysts that can selectively synthesize mirror image isomers having a right-hand/left-hand relation. CD is a phenomenon that occurs due to the difference between absorbance of left-handed circularly-polarized light and right-handed circularly-polarized light when an optically active compound absorbs circularly polarized light, and it cannot be detected unless there is a bias in the generation rate of mirror image isomers. In our analytic system (Fig. 1-a) CD of reaction solution mixtures is analyzed in the process of target reactions by using a catalytic library supported on solid phase substrate. Since the effect of asymmetric catalysts can be relatively evaluated by comparing the peak intensities of reaction solution mixtures without isolating or refining product materials, the time required for catalyst search can be considerably reduced and the ideal catalysts can be found in an expedient manner. Using this system, such catalysts as shown in Fig. 1-b have been successfully developed. Through combination of continuous reactions, we have been able to produce new compounds having unique structures that have not been reported until now.

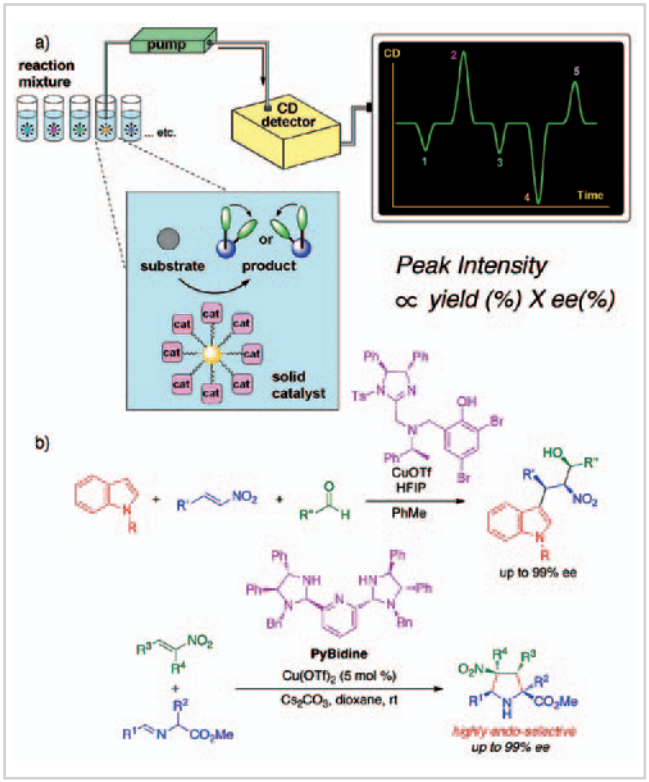

Fig. 1-a: Catalyst Search System
-b: Catalytic Asymmetric Reactions Developed by the System

Prospect of Research

Using this system, catalysts for synthesizing particular compounds can be tailor-made. In addition, we have been recently promoting a study on search for catalysts by magnetic separation through use of catalysts in which magnetic beads are capsuled with organic-inorganic hybrid polymers. We aim at establishing a research base for catalyst development by integrating the above-mentioned technologies.