

【Grant-in-Aid for Specially Promoted Research】 Science and Engineering (Chemistry)



Title of Project : Design of High-Performance Organocatalysts for the Application to Fine Organic Synthesis

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Research Area : Organic Chemistry

Keyword : Organic Synthesis

【Purpose and Background of the Research】

In our country where natural resources are scarce, the field of organic synthesis using traditional biocatalysts and metal catalysts has continuously made a great contribution toward the development of knowledge-intensive science and technology which are indispensable to the synthesis of new functional materials, medicines and agrochemicals. Based on the background, the rational design and synthesis of truly efficient "high-performance organocatalysts" are crucially important for the development of conceptually new synthetic methodologies. Throughout the research, the applicant would like to develop the rising organocatalytic field dynamically, take the international leadership, and make one of the internationally best research groups in this field.

【Research Methods】

Based on the information on the design of fine Lewis acids and organometallic catalysts, the rational design of high-performance organocatalyst will be performed in the research project, which is divided into four main research items consisting of "base organocatalyst", "acid organocatalyst", "polyfunctional organocatalyst" and "radical organocatalyst".

Throughout both the basic and applied researches in this project, the applicant would like to aim at the design and synthesis of a series of truly high-performance organocatalysts for practical organic transformations.

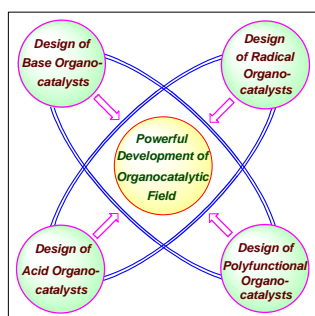


Figure 1. High-Performance Organocatalyst Project

【Expected Research Achievements and Scientific Significance】

Currently, "organocatalyst" has attracted considerable attention as the third catalyst in organic synthesis in addition to the

conventional "biocatalyst" and "metal catalyst". In such an organocatalytic field, the synthesis of "high-performance organocatalyst", if possible, enables the achievement of new reactivity and selectivity, hitherto not obtainable in the conventional "biocatalyst" and "metal catalyst". In addition, such high-performance organocatalysts are expected to create the paradigm of the new research and the development of new science and technology.

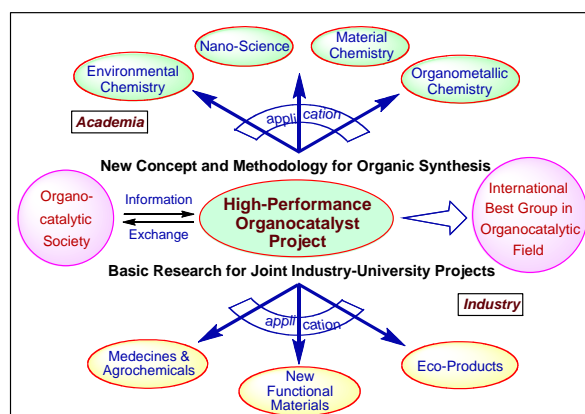


Figure 2. Research Achievement and Future Effect

【Publications Relevant to the Project】

- (1) K. Nakayama and K. Maruoka, Complete Switch of Product Selectivity in Asymmetric Direct Aldol Reaction with Two Different Chiral Organocatalysts from a Common Chiral Source. *J. Am. Chem. Soc.*, **130**, 17666-17667 (2008).
- (2) K. Maruoka, Asymmetric Phase Transfer Catalysis. Wiley-VCH, 2007.

【Term of Project】 FY2009-2013

【Budget Allocation】 426,300 Thousand Yen

【Homepage Address and Other Contact Information】

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