

【Grant-in-Aid for Scientific Research (S)】
Science and Engineering (Chemistry)



Title of Project : Design of Next-Generation Organocatalysts for the Application to Practical, Fine Organic Synthesis

Keiji Maruoka
(Kyoto University, Graduate School of Science, Professor)

Research Project Number : 26220803 Researcher Number : 20135304

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 practical “next-generation 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 high-performance organocatalyst project, the rational design of next-generation organocatalysts will be performed in the research project, which is divided into four main research items consisting of "base organocatalyst", "acid organocatalyst", "acid/base combined 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 practical next-generation organocatalysts for practical organic transformations.

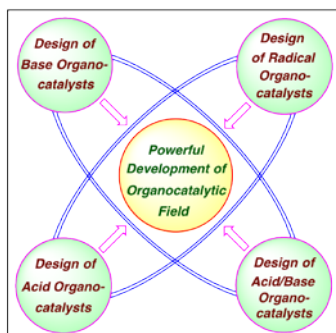


Figure 1. Next-Generation Organocatalyst Project

【Expected Research Achievements and Scientific Significance】

Currently, “organocatalysts” have attracted considerable attention as the third catalyst in organic synthesis in addition to the conventional “biocatalysts” and “metal catalysts”. In such an

organocatalytic field, the synthesis of “next-generation organocatalysts”, if possible, enables the achievement of new reactivity and selectivity, hitherto not obtainable in the conventional “biocatalysts” and “metal catalysts”. In addition, such next-generation organocatalysts are expected to create the paradigm of the new research and the development of new science and technology.

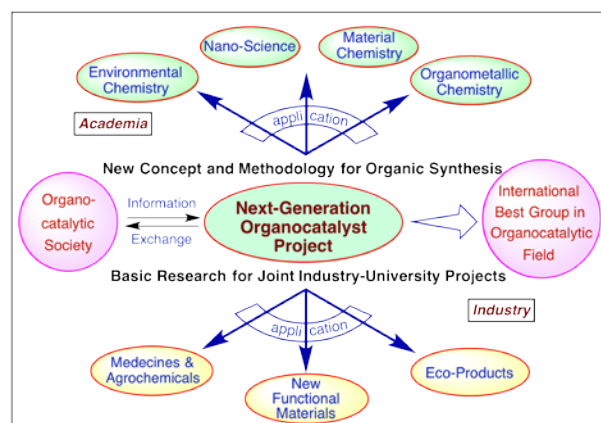


Figure 2. Research Achievement and Future Effect

【Publications Relevant to the Project】

- Enantioselective Base-Free Phase-Transfer Reaction in Water-Rich Solvent. R. He, S. Shirakawa, and K. Maruoka, *J. Am. Chem. Soc.*, **131**, 16620-16621 (2009).
- Recent Developments in Asymmetric Phase-Transfer Reactions, S. Shirakawa and K. Maruoka, *Angew. Chem. Int. Ed.*, **52**, 4312-4348 (2013). [Review Article]

【Term of Project】 FY2014-2018

【Budget Allocation】 150,000 Thousand Yen

【Homepage Address and Other Contact Information】

<http://kuchem.kyoto-u.ac.jp/yugo/english/index.html>
maruoka@kuchem.kyoto-u.ac.jp