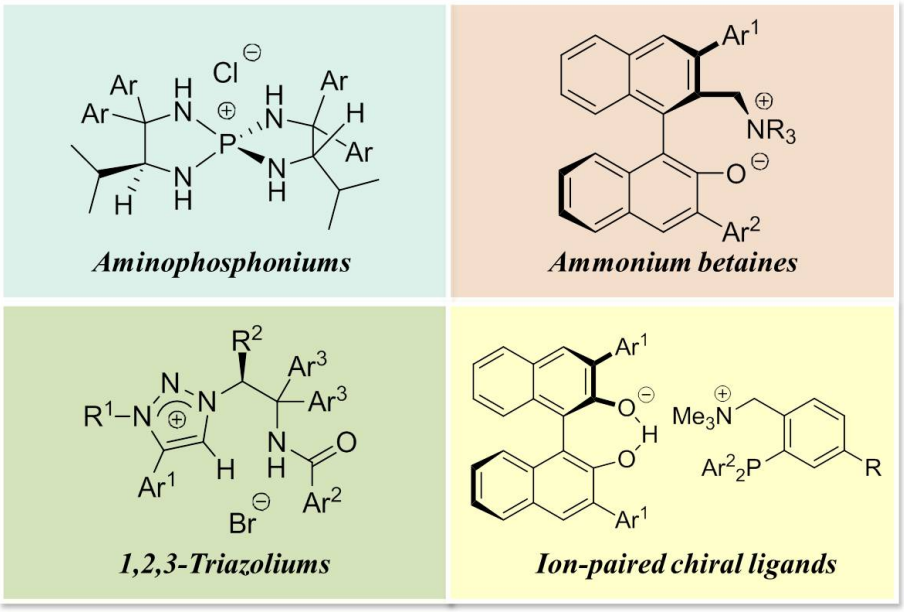
Asymmetric Catalysis of Designer Chiral Organic Ion Pairs

Takashi Ooi
Institute of Transformative Bio-Molecules (WPI-ITbM) and Department of Applied Chemistry
Nagoya University, Chikusa, Nagoya 464-8603 Japan
tooi@apchem.nagoya-u.ac.jp

Quaternary onium salts have been routinely employed in organic synthesis and have played various yet important roles as stoichiometric reagents, reactive intermediates, ionic liquids, and catalysts. Among them, the catalytic usage of this class of compounds, particularly chiral, nonracemic ones, has recently gained much attention because of the unique properties of these compounds such as the chemical stability, the ease of handling, and the ability of directly controlling reactive anionic species. However, the actual utility of chiral quaternary onium salts as a molecular catalyst is still very limited probably due to the lack of rational approach to control entire structure of an organic ion pair assembled through non-directional electrostatic interaction. We have been tackling this intrinsic problem by the molecular design of a series of chiral quaternary onium salts and their structural modifications for eliciting unique functions as molecular catalysts, which can be successfully applied to the development of synthetically valuable carbon-carbon and carbon-heteroatom bond-forming reactions.[1-3] In this lecture, I would like to present the details of this research stream with particular focus on the recent advances.



Reference:

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3. Ohmatsu, K.; Ito, M.; Kunieda, T.; Ooi, T. *Nature Chem.* **2012**, *4*, 473.