

**Research on the Low-Coordinate and Multiply-Bonded Compounds
of Heavier Main Group Elements**

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【Outline of survey】

Compounds featuring the multiple bonds between the elements of the second period are among the milestone derivatives of organic chemistry, whose richness and diversity are in a great extent caused by the ability of carbon to form multiple bonds resulting in the formation of many important classes of unsaturated compounds (alkenes, alkynes, dienes, cumulenes, etc.). By contrast, the heavier main group elements are much more reluctant towards the formation of multiple bonds, and the synthesis of their stable derivatives was accomplished only recently being dated back to the middle of 1970s. In this project, we are aiming to develop the novel sophisticated synthetic strategies for the preparation of highly challenging classes of low-coordinate derivatives of the heavier main group elements (multiply-bonded compounds, radicals, cations, etc.), perform the detailed analysis of their structural and synthetic properties, and carry out the systematic study of the basic similarities and differences between organic species and their organometallic analogues.

【Expected results】

Our systematic study will be focused on the synthesis of the multiply-bonded and other low-coordinate derivatives of the heavier main group elements. The tight interplay and cooperation between the experiment and theory, planned throughout the project, will significantly strengthen the overall impact of the project results. The new knowledge, which will be obtained during the project term, is expected to bridge the latest developments in both organic and organometallic chemistry and greatly contribute to both fundamental chemistry and material science.

【References by the principal investigator】

- A Stable Compound Containing a Silicon-Silicon Triple Bond, Sekiguchi, A.; Kinjo, R.; Ichinohe, M. *Science* **2004**, *305*, 1755-1757.
- Cyclotrisilylium Ion: The Persilaaromatic Compound, Ichinohe, M.; Igarashi, M.; Sanuki, K.; Sekiguchi, A. *J. Am. Chem. Soc.* **2005**, *127*, 9978-9979.
- Si-, Ge- and Sn-centered Free Radicals: From Phantom Species to Grams-Order-Scale Materials, Lee, V. Ya.; Sekiguchi, A. *Eur. J. Inorg. Chem.* **2005**, 1209-1222.

【 Term of project 】 FY2007 – 2011

【Budget allocation】 44,200,000 yen

(2007 direct cost)

【Homepage address】

<http://www.chem.tsukuba.ac.jp/sekiguch/index.html>