

# Reaction Chemistry of Transition metal Clusters

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## 【Outline of survey】

Transition metal cluster is an interesting class of molecular compound in which the metal centers are directly bound to one another, and has the remarkable properties of multi-electron transfer and multiple coordination. There have been few systematic studies on the reaction chemistry of the transition metal clusters thus far, although they have been intensively investigated in the quest to develop new and effective organic transformations achieved by the synergetic effect of the metal centers.

We will explore the following subjects during the term of this research project: (1) synthesis of clusters with higher nuclearity, (2) synthesis of heterometallic clusters, (3) modification of the electronic and steric environment of the reaction site, (4) elucidation of mechanism of the cluster reaction and quantitative evaluation of "cluster effect", (5) theoretical study of the mechanism of the cluster reaction and synergetic effect, and (6) synthetic application of alkane, ammonia, carbon dioxide, and dinitrogen by the use of transition metal cluster as an activator.

## 【Expected results】

The molecular size of the cluster is between those of common homogeneous transition metal catalysts and heterogeneous metal catalysts. Systematic study of the reaction chemistry of the cluster complex through this research project will lead to development of a really new catalyst which has merits of both homogeneous and heterogeneous catalysts.

## 【References by the principal researcher】

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【Term of project】 FY2006 - 2010

【Budget allocation】 40,100,000 yen

【Homepage address】

<http://www.apc.titech.ac.jp/~hsuzuki/index-e.html>