

# SUNADA LAB.

## [Precise Design of Functional Metal Clusters]

Institute of Industrial Science,  
Department of Materials and Environmental Science

Engineering  
/Applied  
Chemistry

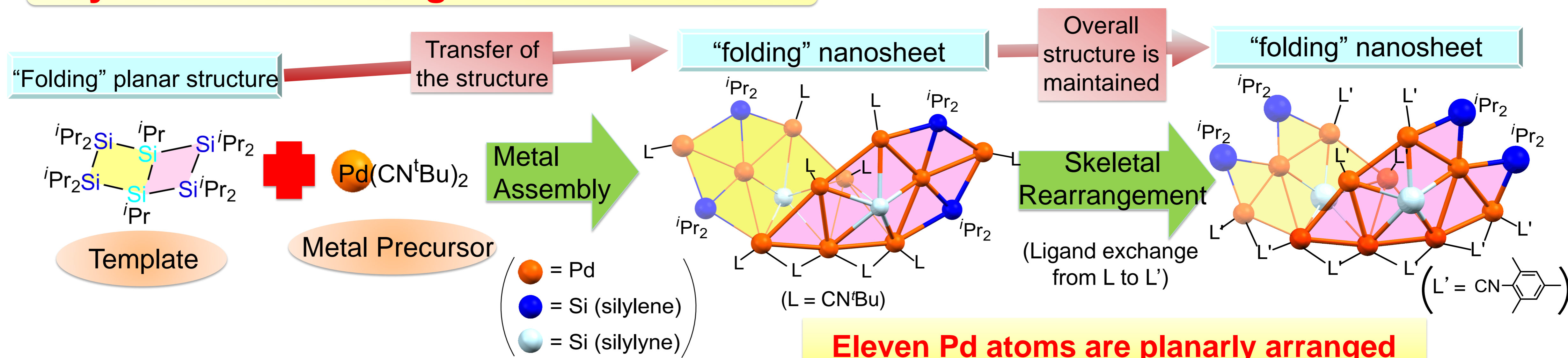
### Functional Metal Cluster Science

## Development of well-designed metal clusters

Nanosized metal compounds have attracted much interests owing to their own unique properties attributed to the nanosized effect. Our research interests focus on the design and synthesis of a series of well-defined nanosized transition metal clusters, and their application as functional materials.

### ◆ Development of template synthesis of nanosized metal clusters

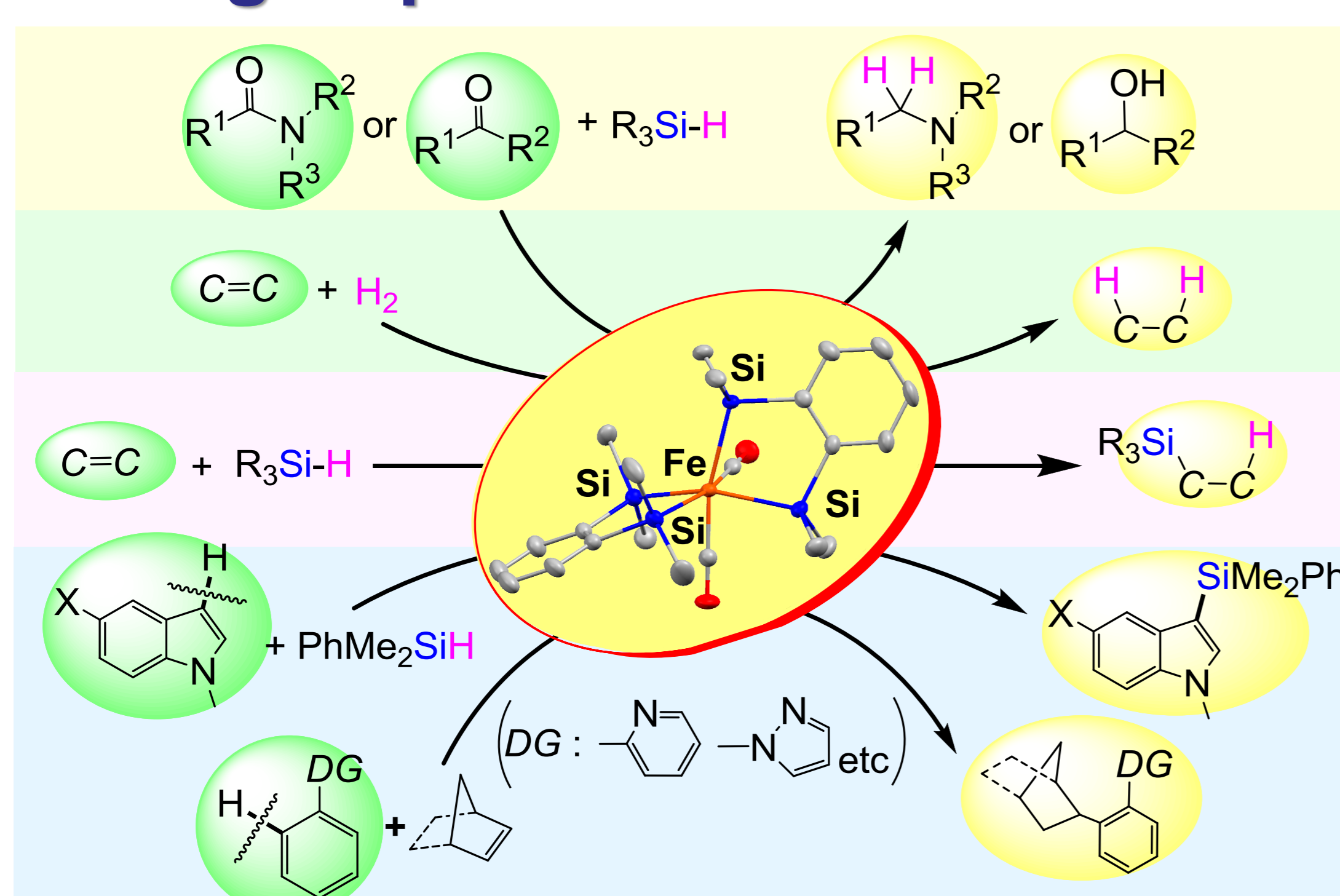
#### <Synthesis of “folding” Pd<sub>11</sub> nanosheet>



Sunada, Y. et al., *Nature Communications* **2013**, 4, 1/3014 – 7/3014.

- ✓ Well-designed metal cluster can be effectively synthesized by “template synthesis”
- ✓ Metal arrangement can be finely tuned by “ligand exchange”
- ✓ Application as catalysts, photo- and electronic- devices

### ◆ Synthesis of novel complexes consisting of both transition metal and the main group elements



Reduction of carbonyl compounds
Medical and agrochemical intermediates
Hydrogenation
Medical and agrochemical intermediates
Hydrosilylation
Synthesis of silicone materials
C-H bond functionalization
Extremely Difficult Substrate Conversion

- ✓ Development of new iron-based catalyst having disilametallacycle skeleton
- ✓ A variety of catalysis are realized without the use of precious metal catalysts.

*Angew. Chem. Int. Ed.*, **2009**, 48, 9511.  
*Chem. Commun.*, **2011**, 47, 6581.  
*Dalton Trans.* **2013**, 48, 16687.  
*Organometallics* **2014**, 33, 5936.  
*Organometallics* **2015**, 34, 2896.