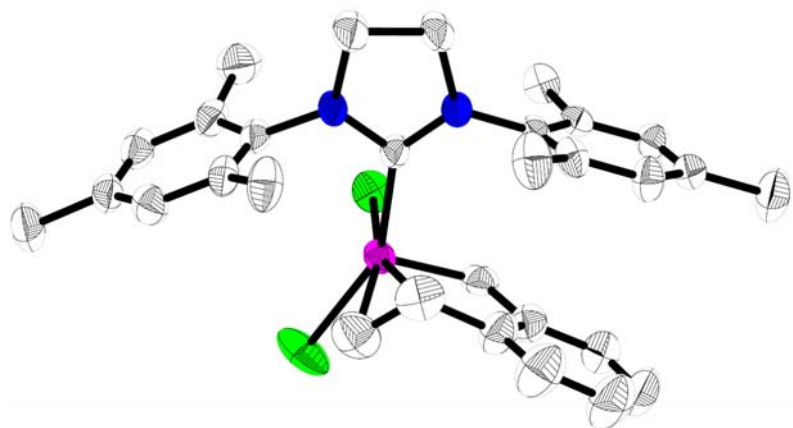


# ***Ruthenium-Olefin Complexes as Model Compounds of Olefin Metathesis Reaction Intermediates***



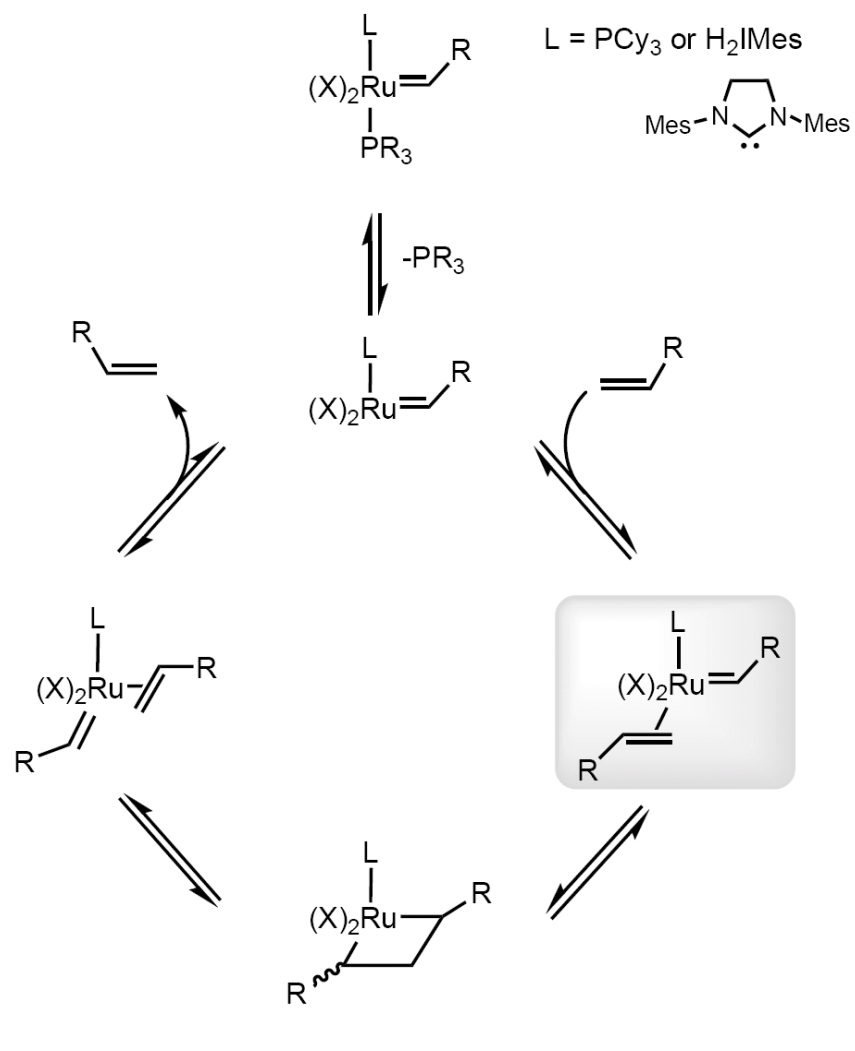
Donde R. Anderson  
Grubbs Laboratory

**ISOM**  
international symposium on olefin metathesis

July 29, 2007



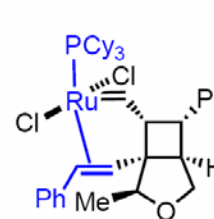
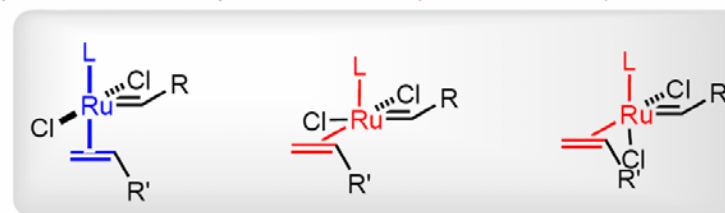
# Mechanism of Olefin Metathesis



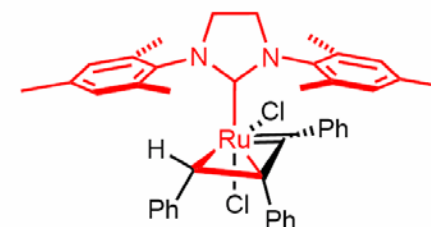
Few studies have attempted to structurally characterize intermediates in the catalytic cycle due to their short lifetimes.

bottom-bound olefin  
(L trans to olefin)

side-bound olefin  
(L cis to olefin)



Tallarico, J. A.; Bonitatebus, P. J., Jr.; Snapper, M. L. *J. Am. Chem. Soc.* **1997**, *119*, 7157.

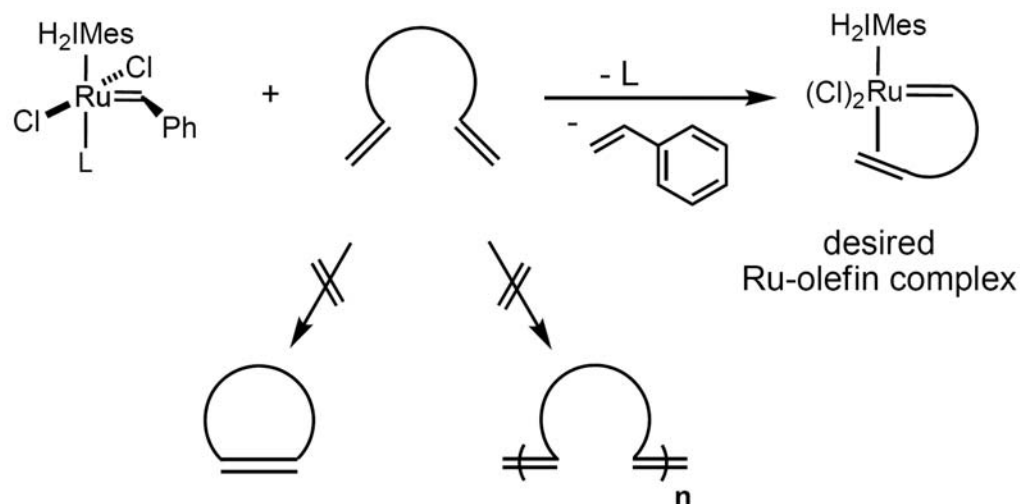


Trnka, T.; Day, M. W.; Grubbs, R. H. *Organometallics* **2001**, *20*, 3845.

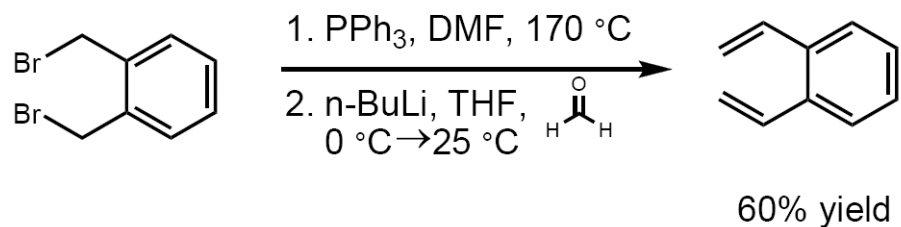
Ruthenacyclobutane studies: Romero, P. E.; Piers, W. E. *J. Am. Chem. Soc.* **2005**, *127*, 5032.

# Designing Stable Ru-olefin Complexes

- Goal: Study structure and properties of isolable Ru-olefin complexes



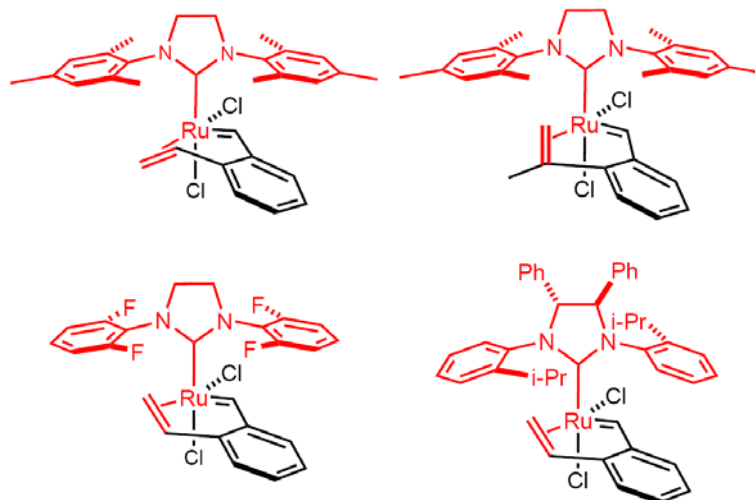
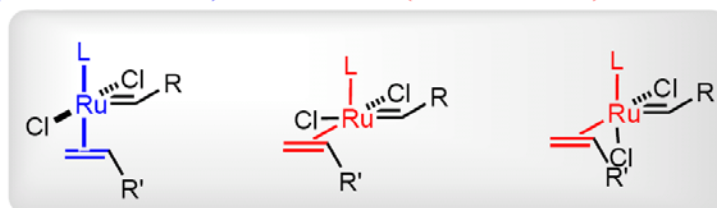
- Ligand precursor should:
  - Form a stable chelate
  - Not undergo facile intramolecular or intermolecular metathesis reactions
  - Form only one product
    - Utilize a symmetric diene or a substrate with electronically/sterically differentiated olefins



# Project Summary

bottom-bound olefin  
(L trans to olefin)

side-bound olefin  
(L cis to olefin)



- A model system to study ruthenium-olefin complexes related to the mechanism of olefin metathesis has been developed.
- NMR and solid-state structural studies of a series of different NHC-based ruthenium complexes show evidence of only side-bound isomers.