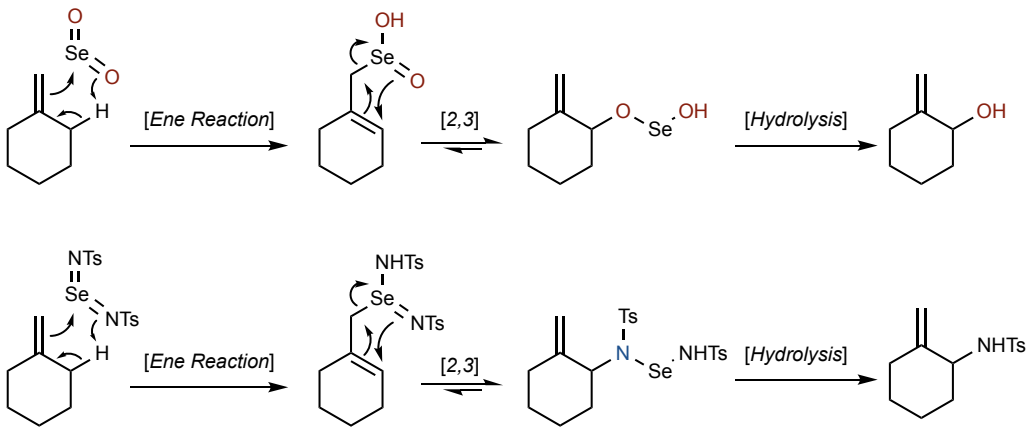
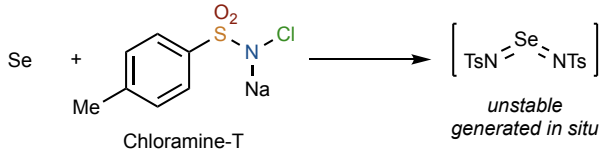
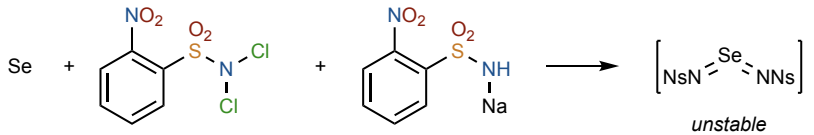
Sharpless-Kresze Amination



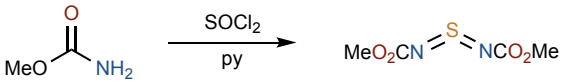
- *much more reactive than SeO_2*
- *absence of rearranged products*
- *positional selectivity similar to SeO_2*



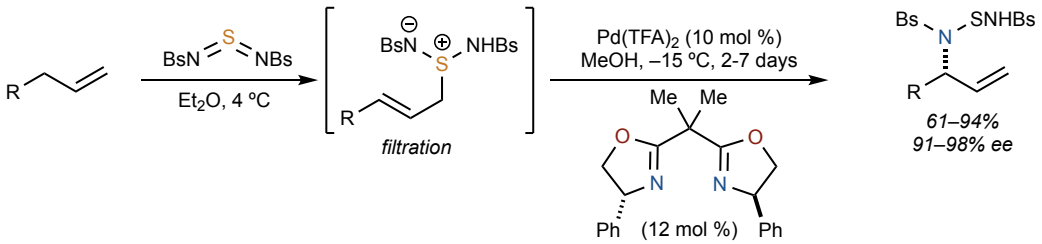
Sharpless *Angew. Chem. Int. Ed.* **1996**, *35*, 454



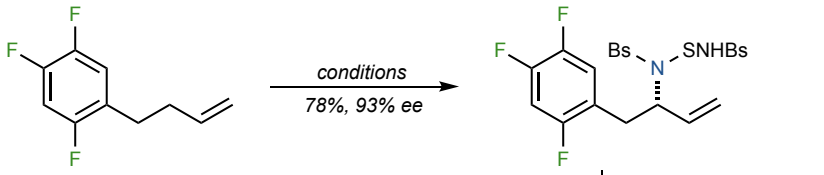
Kresze *J. Org. Chem.* **1983**, *48*, 3561



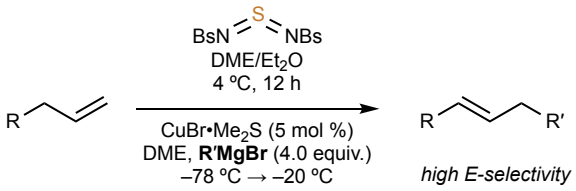
Tambar *J. Am. Chem. Soc.* **2012**, *134*, 18495; https://doi.org/10.1021/ja307851b



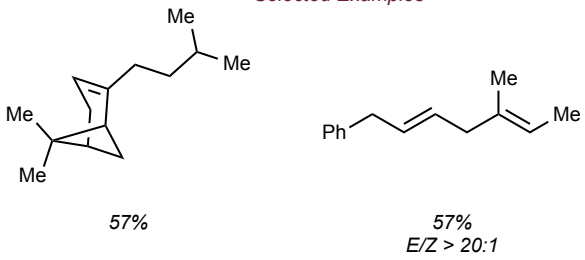
Tambar *Synlett* **2013**, *24*, 2459

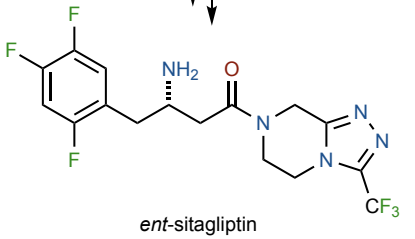


Tambar *Angew. Chem. Int. Ed.* **2014**, *53*, 1664; **https://doi.org/10.1002/anie.201309134**



Selected Examples



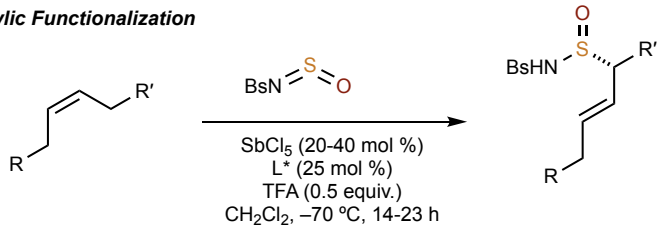


Sharpless-Kresze Amination

Tambar *Nature* **2017**, *547*, 196; https://doi.org/10.1038/nature22805

Tambar *J. Am. Chem. Soc.* **2019**, *141*, 17305; https://doi.org/10.1021/jacs.9b08801

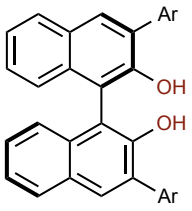
Enantioselective Allylic Functionalization



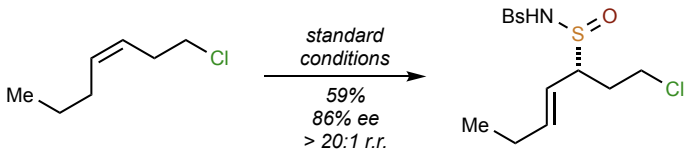
Compatable FG: Ts-Indole, –OTFA, –Hal

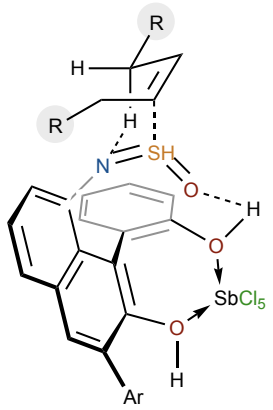
Positional selectivity: CH_2 > CH_3 > CH

Positional selectivity: sensitive to electronic effects

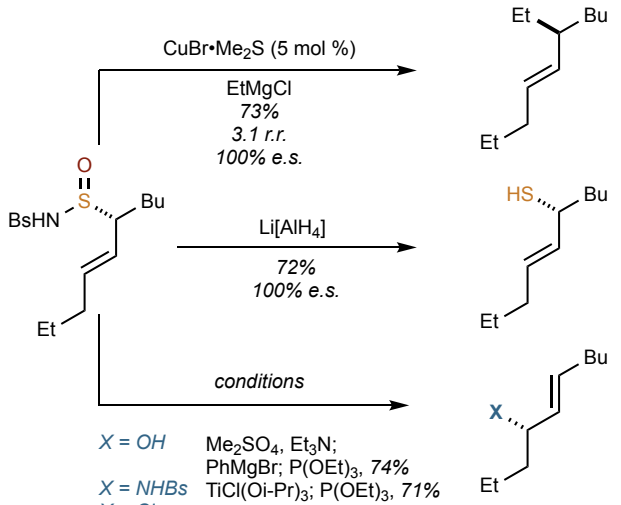


Ar = 3,5-$(CF_3)_2$Ph





- *Lewis-acid-assisted Bronsted acidity (LBA)*
- *Protonation lowers LUMO*
- *Cis-olefin provides higher enantioselectivity*
- *Exo transition state*

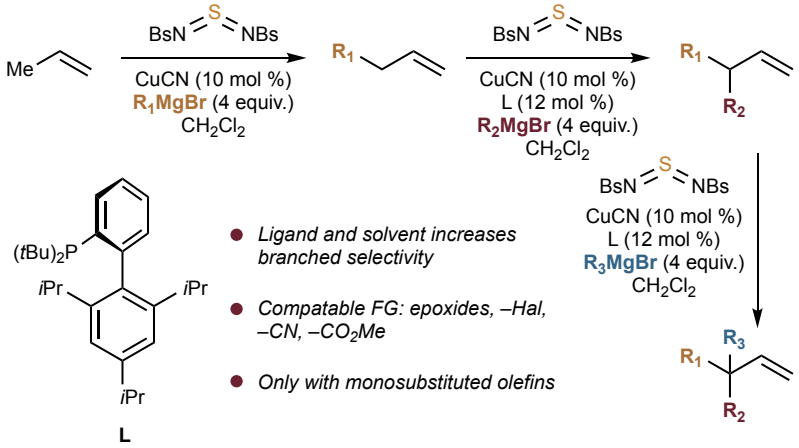


X = OH Me_2SO_4, Et_3N; PhMgBr; $P(OEt)_3$, *74%*

X = NHBs $TiCl(Oi\text{-}Pr)_3$; $P(OEt)_3$, *71%*

X = Cl SO_2Cl_2, *94%, 3:1 r.r.*

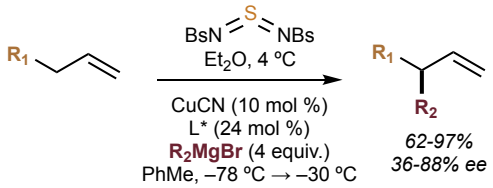
Sequential Allylic Alkylation

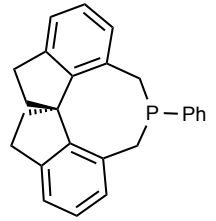
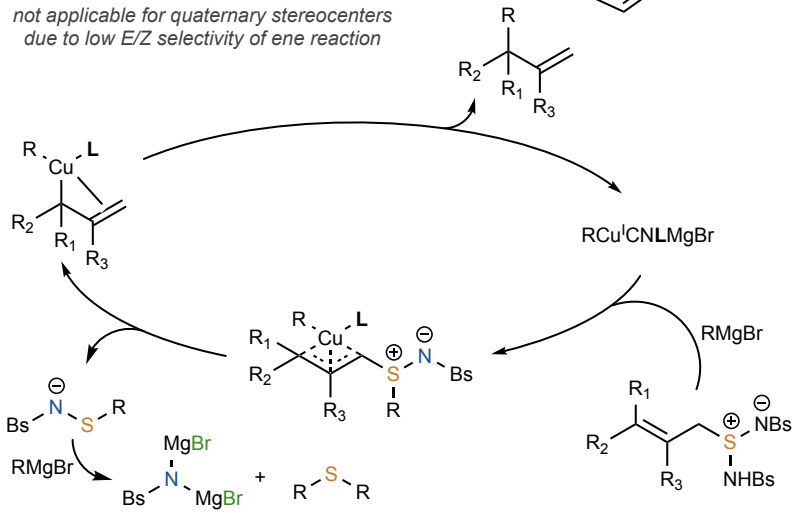


L

- *Ligand and solvent increases branched selectivity*
- *Compatable FG: epoxides, –Hal, –CN, –CO_2Me*
- *Only with monosubstituted olefins*

Enantioselective Allylic Alkylation





not applicable for quaternary stereocenters due to low E/Z selectivity of ene reaction