Carbonyl 1,2-transposition through triflate-mediated α-amination

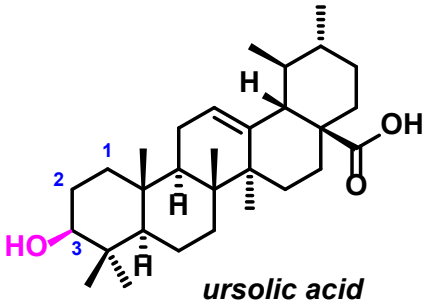
Zhao Wu, Xiaolong Xu, Jianchun Wang, Guangbin Dong*

Science 374, 734–740 (2021)

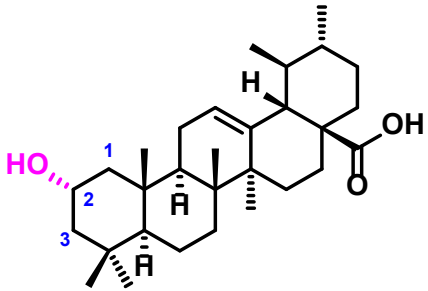
Lu zhe Qin

2022-01-15

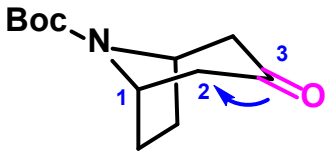
Carbonyl 1,2-transposition



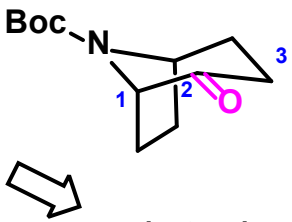
ursolic acid



glycogen phosphorylase inhibitor
13-fold potency boost



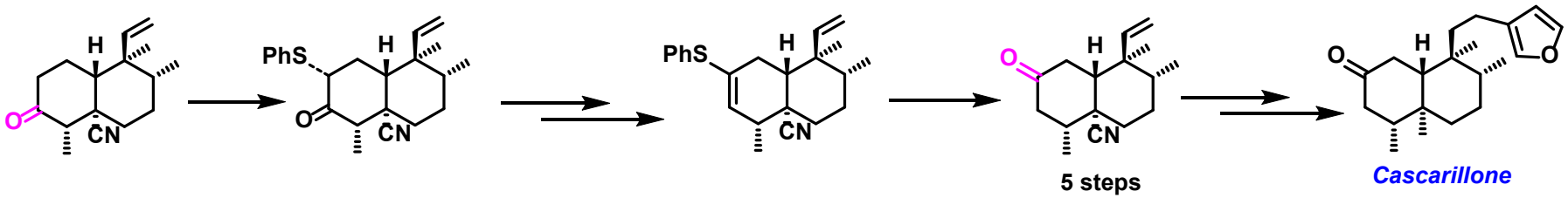
N-Boc-nortropinone

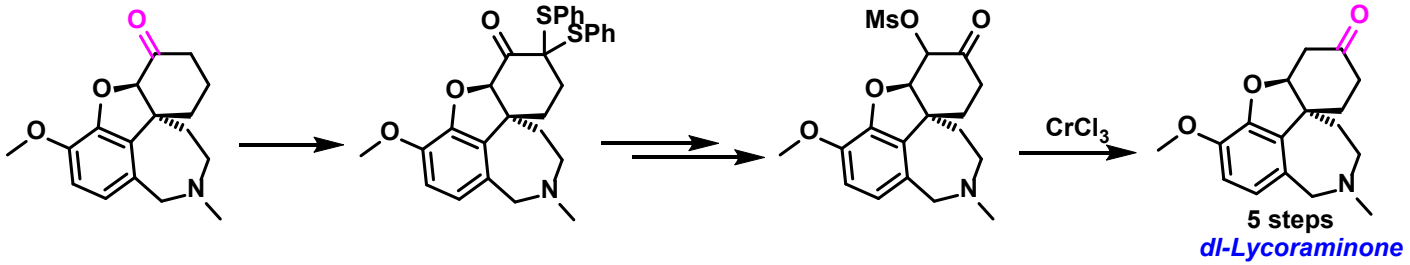


against aminoglycoside antibiotic-induced hair cell death
9-fold potency boost

J. Nat. Prod. 2009, 72, 1414–1418.
J. Med. Chem. 2018, 61, 84−97.

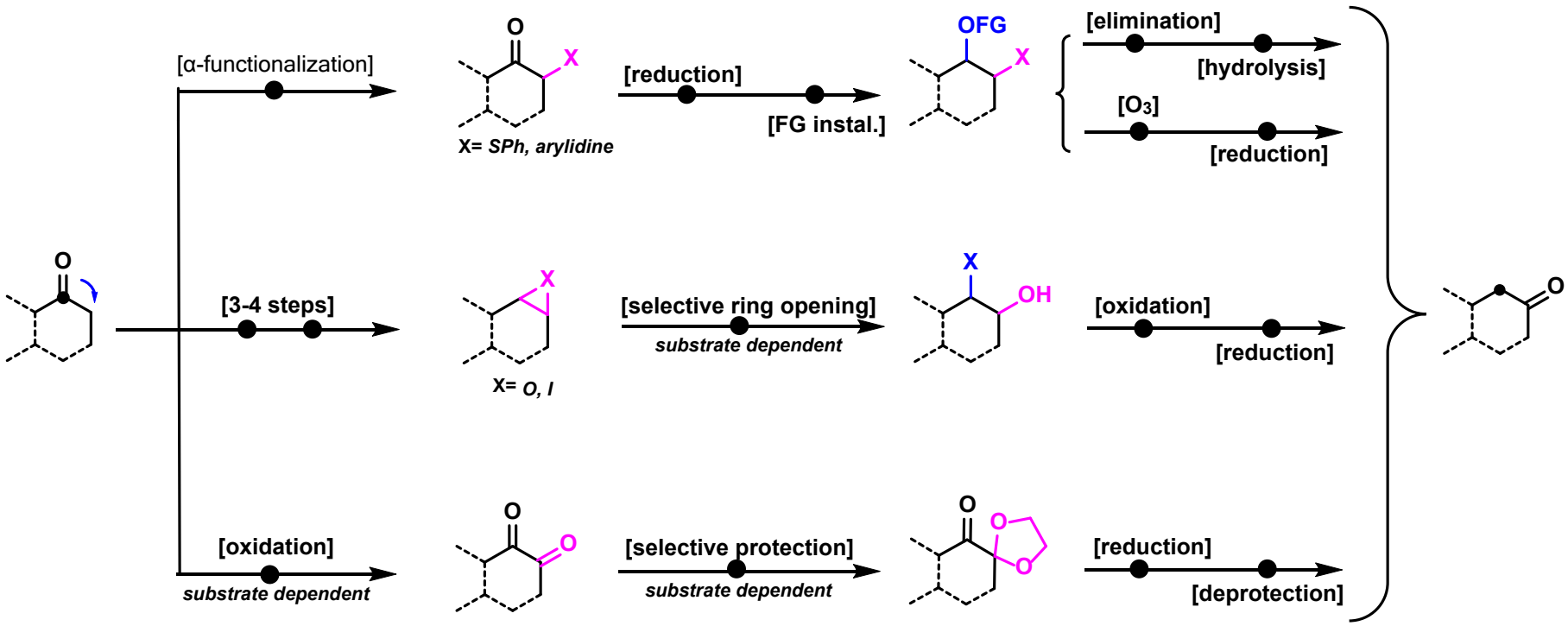
Carbonyl 1,2-transposition





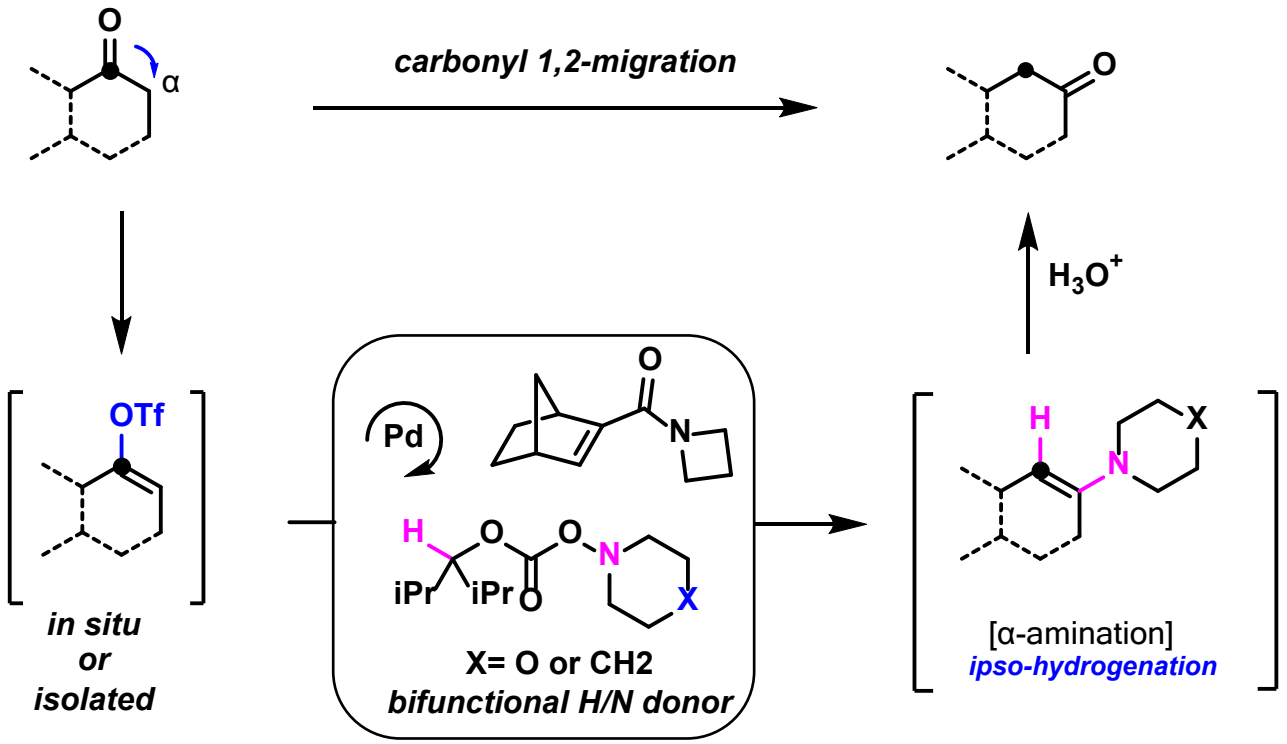
J. Chem. Soc. Perkin Trans. I 1989.
Journal of the American Chemical Society 99, 24, November 23, 1977

Carbonyl 1,2-transposition



Chem. Soc. Rev., 1982,11, 397-434.
J. Chem. Soc. C, 1970, 244-250.

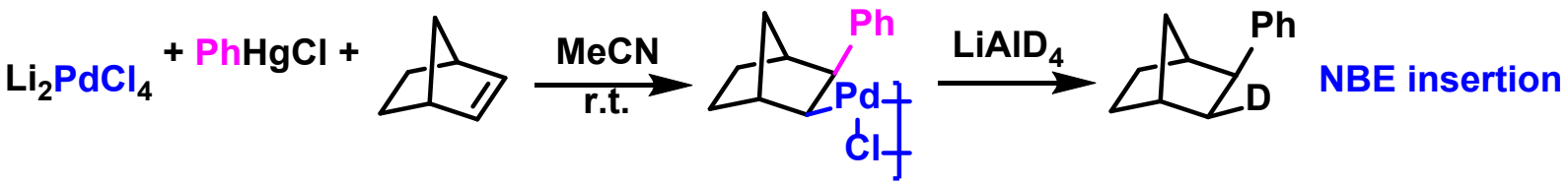
Carbonyl 1,2-transposition



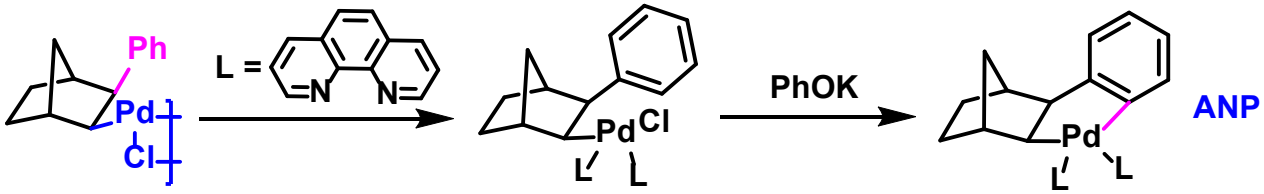
Chem. Commun., 2005, 973–986.
Science, 2021, 374, 734–740.

Pd/NBE

Horino 1974



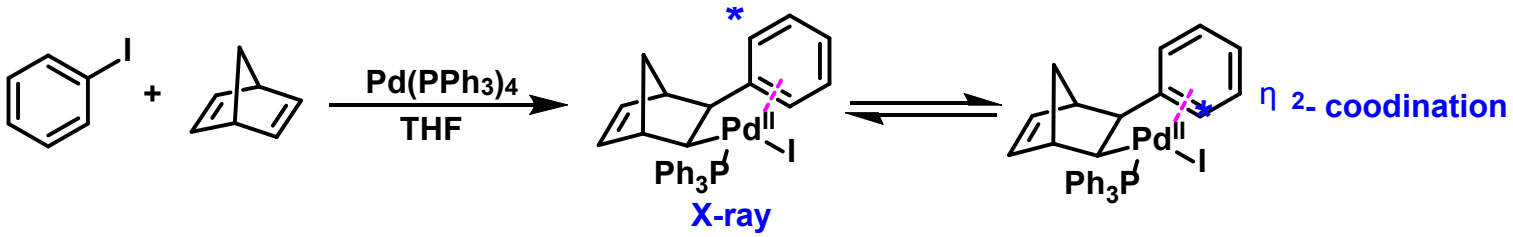
Catellani 1988



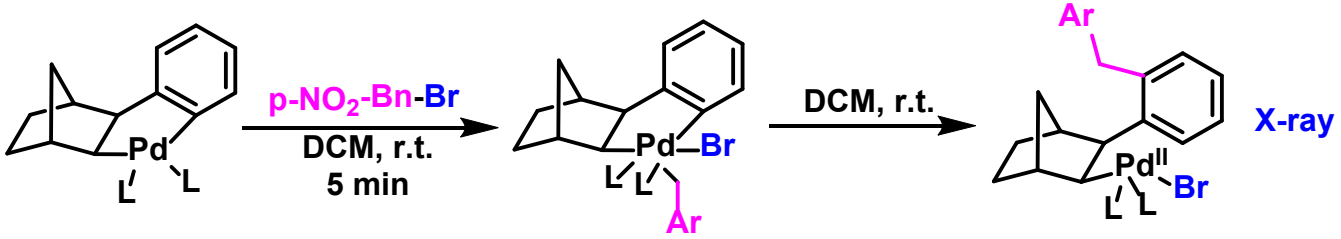
Tetrahedron Lett. 1974, 15, 647−650.
J. Organomet. Chem. 1988, 346, C27−C30.

Pd/NBE

Cheng 1991



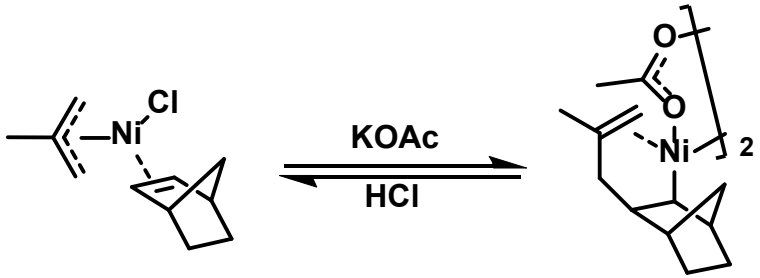
Catellani 1993



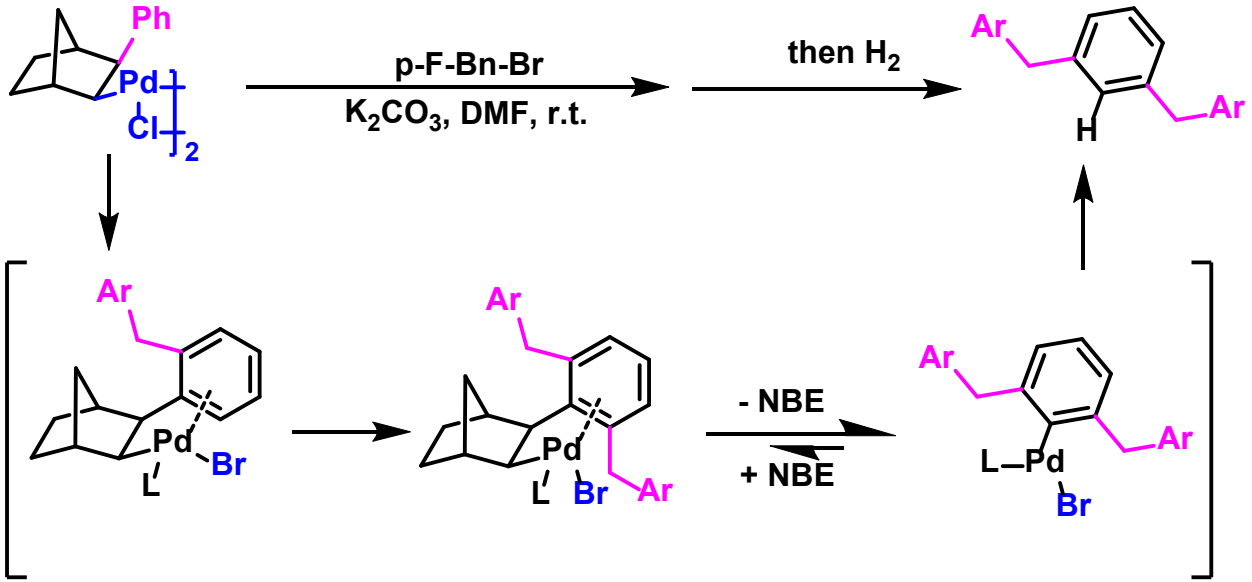
Chem. Commun. 1991, 710−712.
J. Organomet. Chem. 1993, 458, C12−C15.

Pd/NBE

Porri 1975

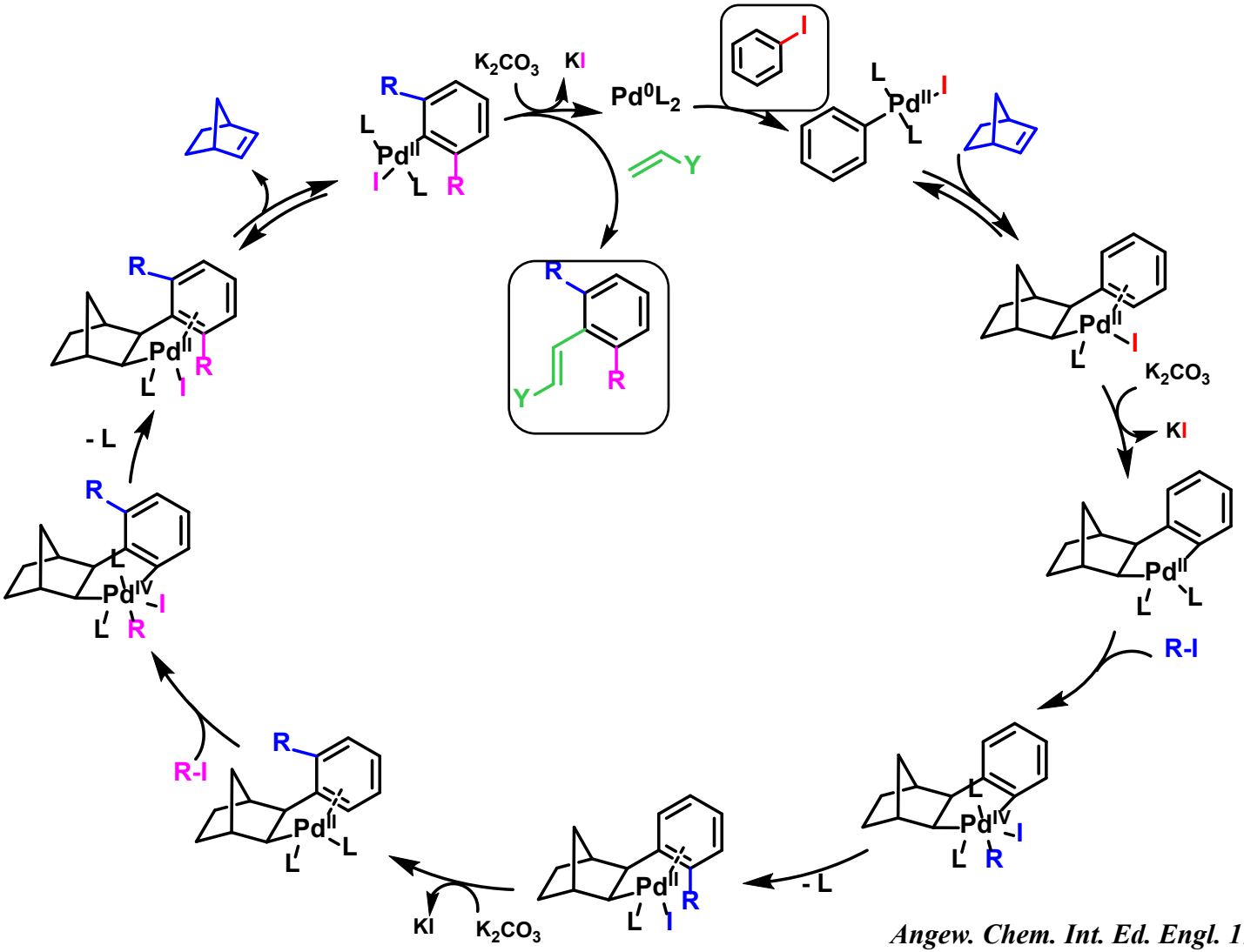


Catellani 1994



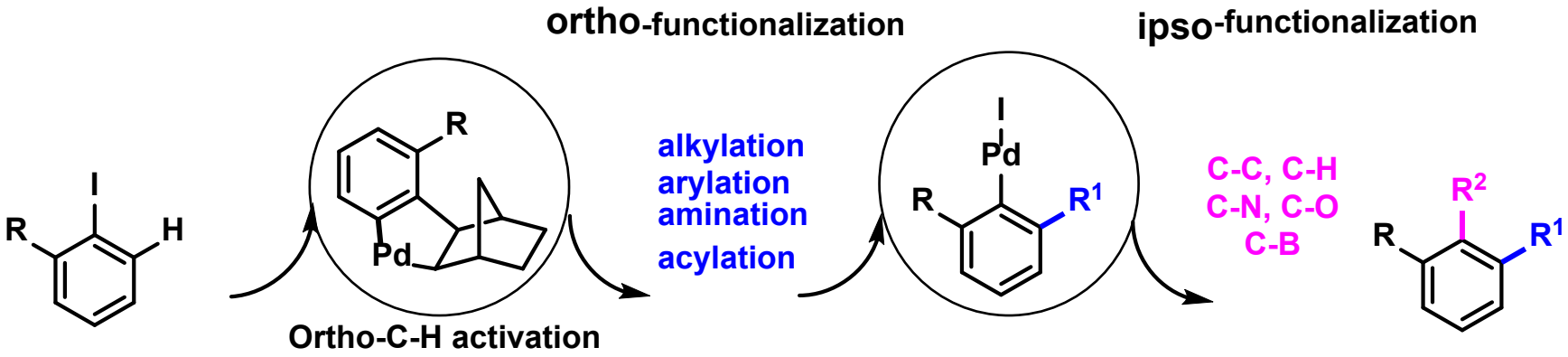
J. Organomet. Chem. 1975, 97, 131−138.
Angew. Chem., Int. Ed. Engl. 1994, 33, 2421−2422.

Pd/NBE-Catellani reaction



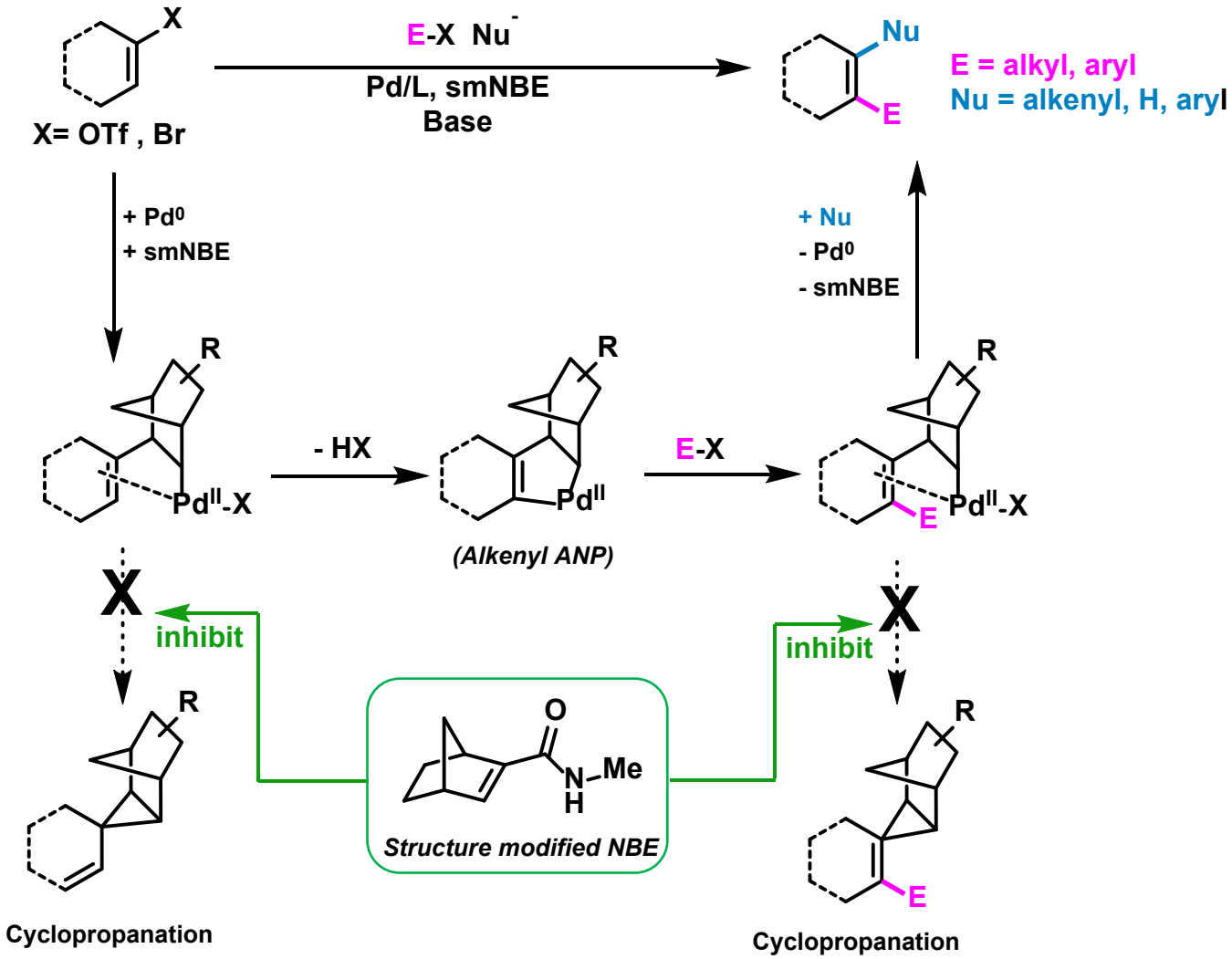
Angew. Chem. Int. Ed. Engl. 1997, 36, No. 1/2
Acc. Chem. Res. 2016, 49, 1389−1400

Pd/NBE-Catellani type reaction



Angew. Chem. Int. Ed. Engl. 1997, 36, No. 1/2
Acc. Chem. Res. 2016, 49, 1389−1400

Pd/NBE-Catellani type reaction



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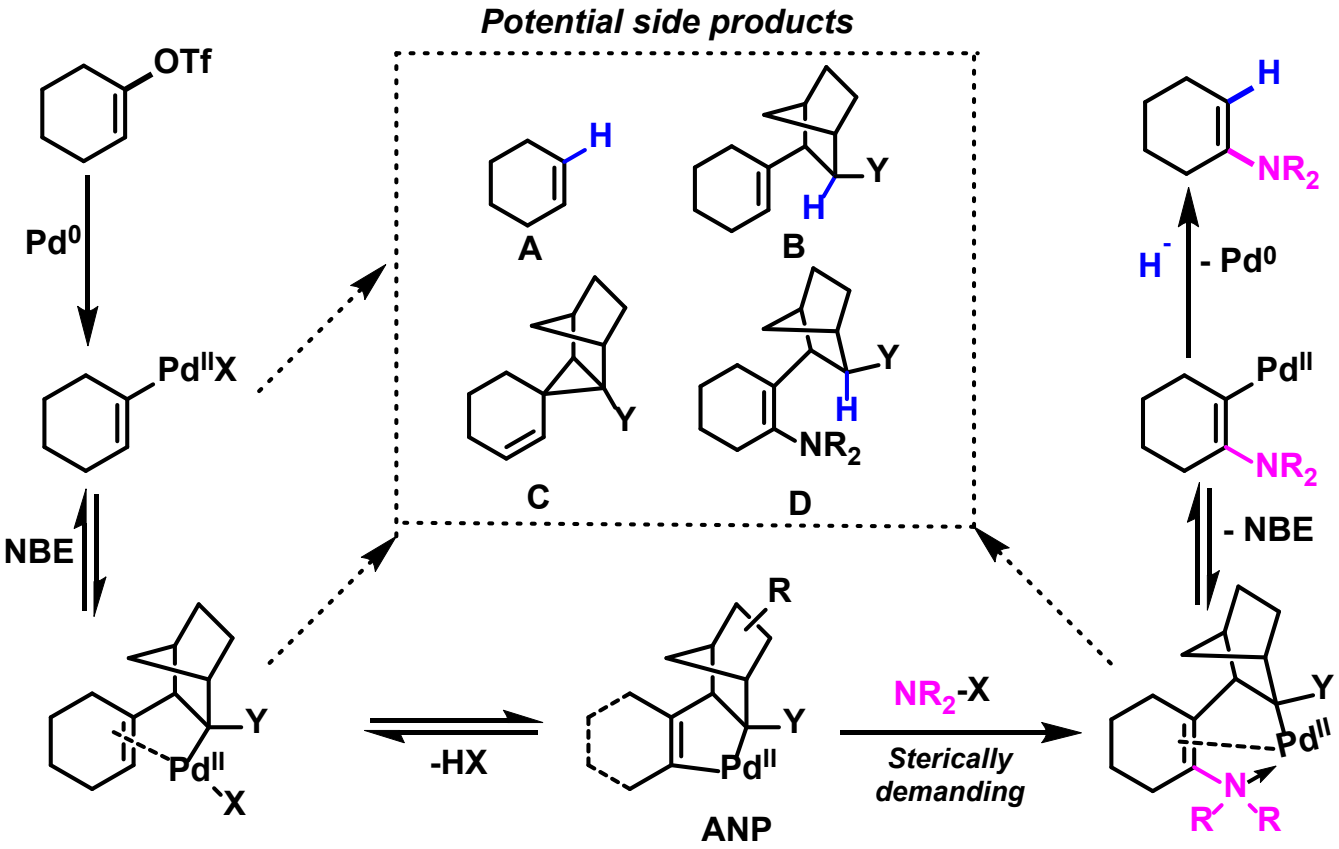
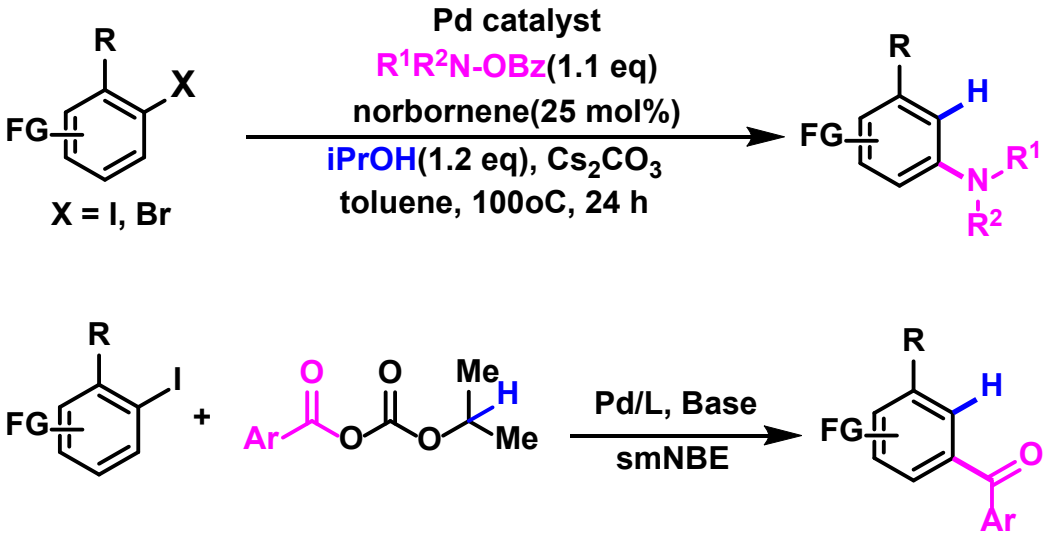
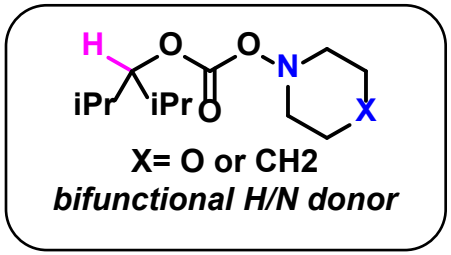
Challenges and mechanistic considerations



Science, 2021, 374, 734–740.

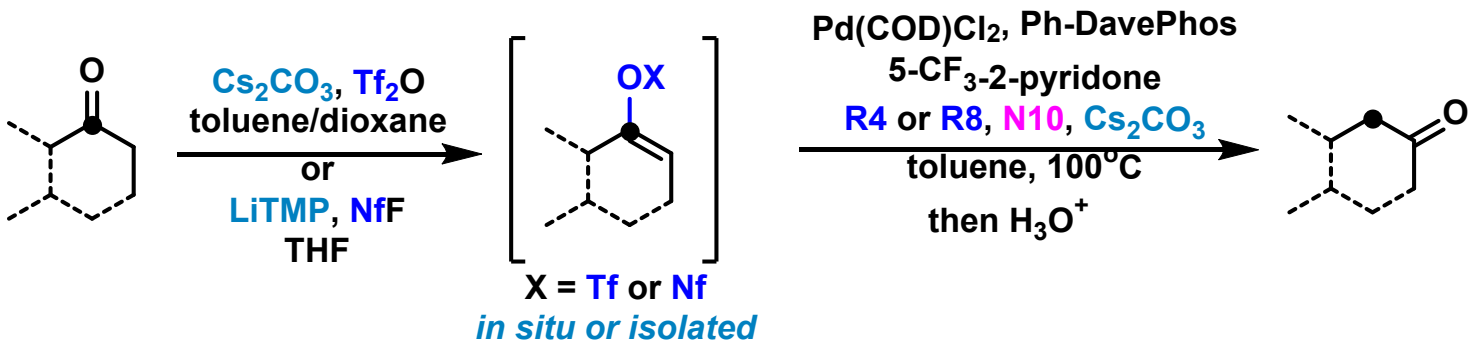
Bifunctional reagents

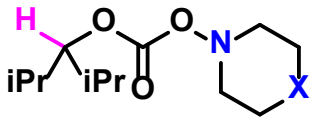




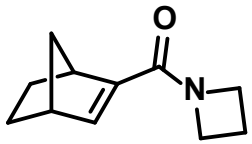
J. Am. Chem. Soc. 2013, 135, 49, 18350–18353.
Angew. Chem. 2015, 127, 12855 – 12859

Carbonyl 1,2-transposition





R4: X = O
R8: X = CH2



N10

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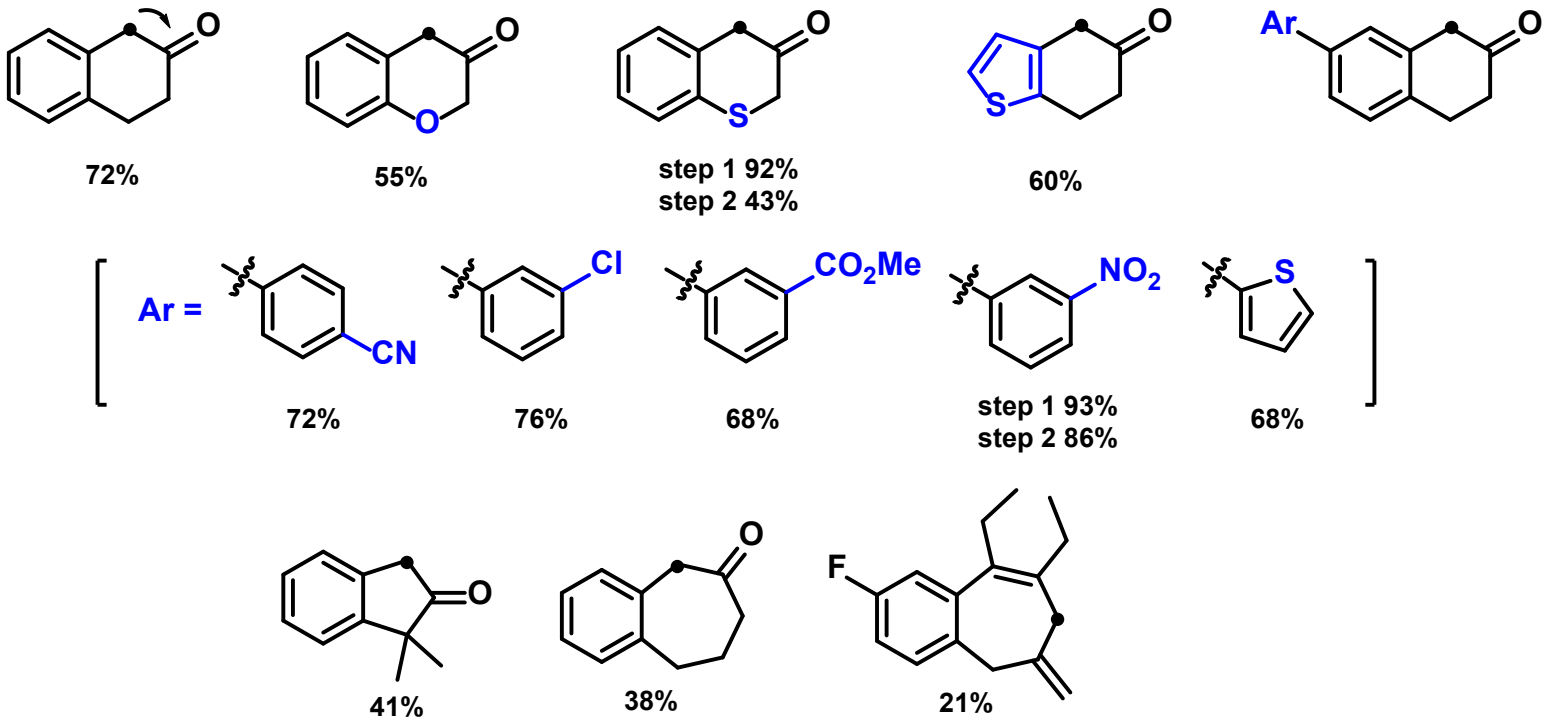
Substrate scope

conjugeted alkenyl triflates



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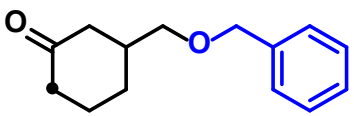
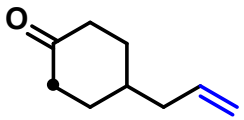
Substrate scope

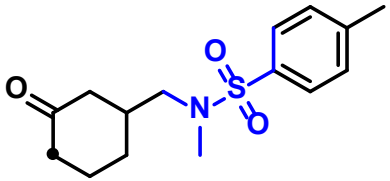
non-conjugated alkenyl triflates



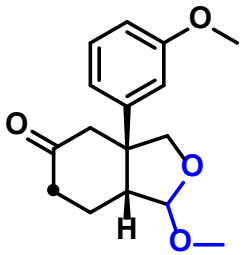
step 1 87%
step 2 56%



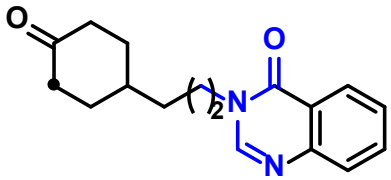
step 1 89%
step 2 57%



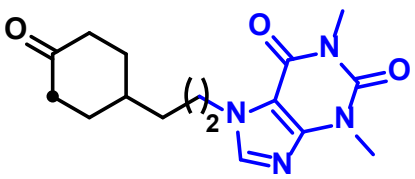
step 1 87%
step 2 53%



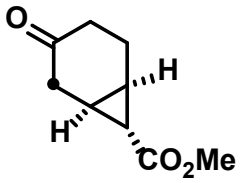
step 1 86%
step 2 49%



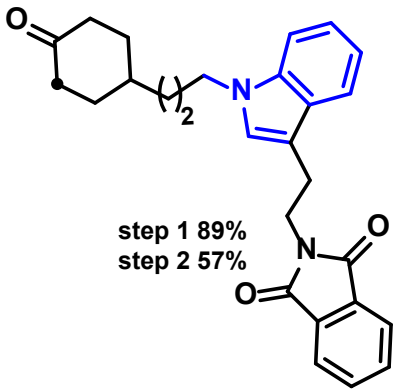
step 1 92%
step 2 64%



step 1 99%
step 2 60%



step 1 99%
step 2 61%



step 1 89%
step 2 57%

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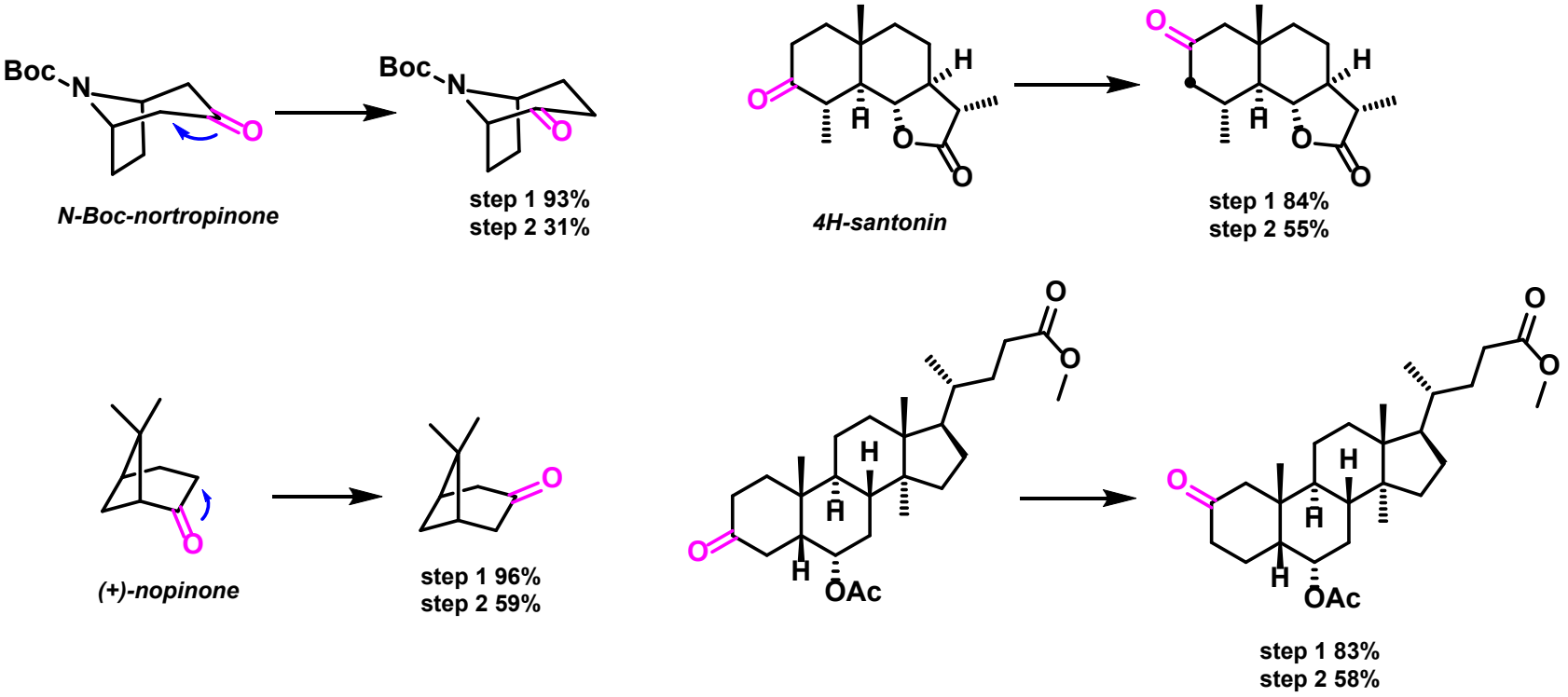
Substrate scope

Natural product derivatives



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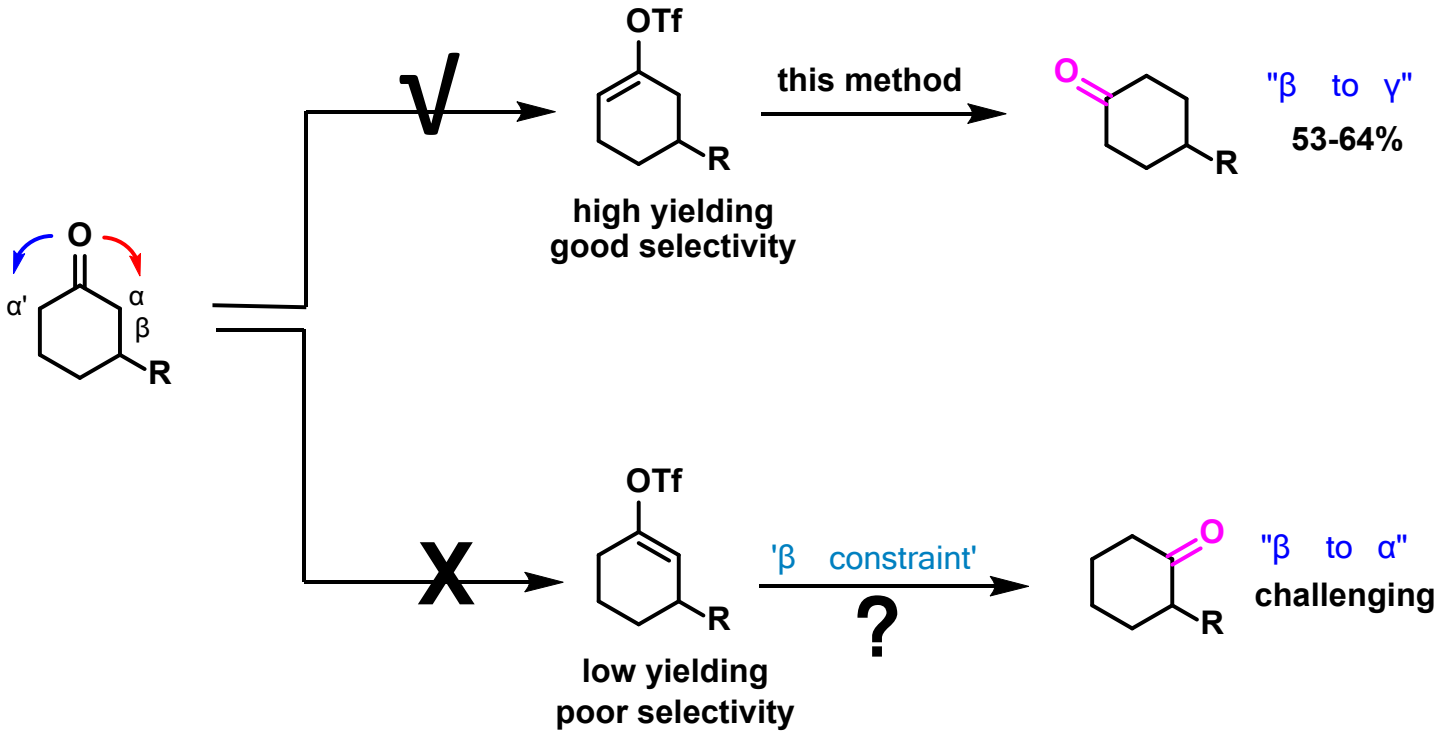
β-constraint



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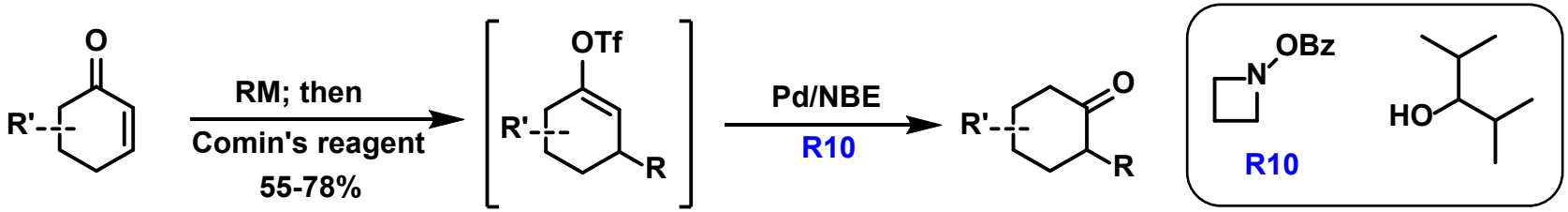
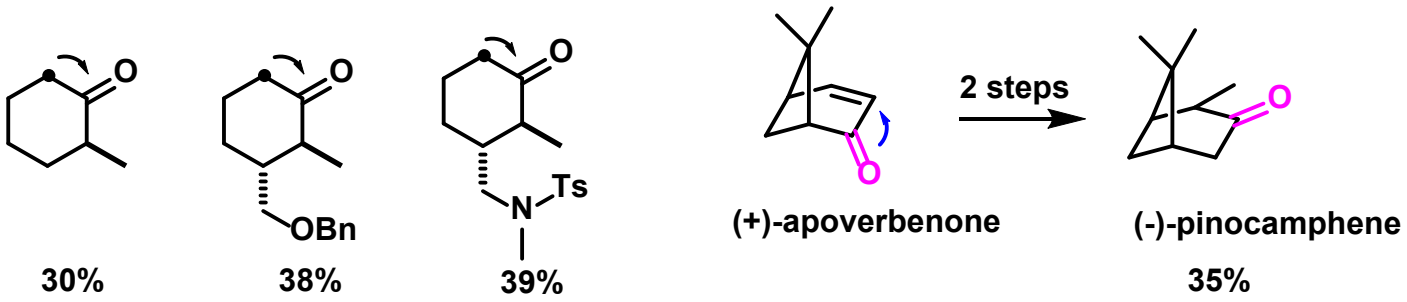
Surmounting the β-constraint via conjugate addition





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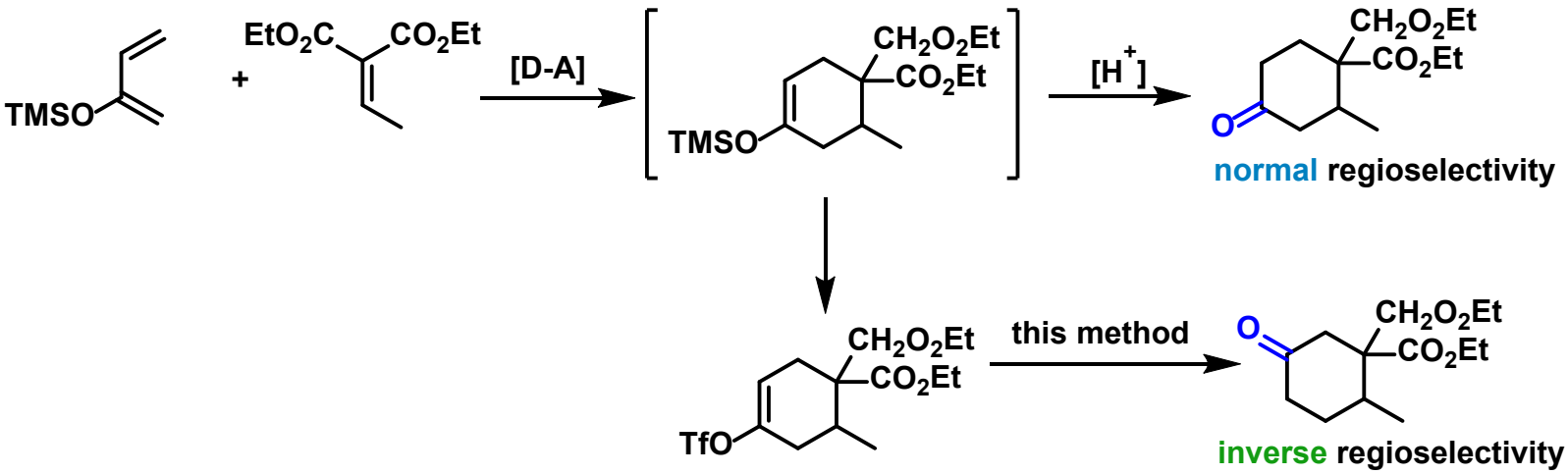
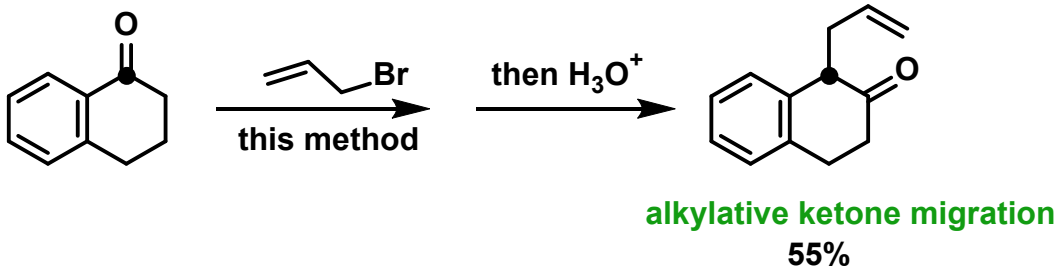
Synthetic application





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Education & Past Positions:

- B.S. in Chemistry, Peking University, Beijing, China, 1999 – 2003(Zhen-Yang/Jiahua Chen)
- Ph.D. in Chemistry, Stanford University, Stanford, California, 2004 – 2009(Barry M. Trost)
- Camille and Henry Dreyfus Postdoctoral Fellow, California Institute of Technology, 2009 – 2011(Robert H. Grubbs)
- Assistant Professor, CPRIT Scholar for Cancer Research, University of Texas at Austin, 2011 – 2016
- Professor of Chemistry, The University of Chicago, 2016-

Research Interests:

- C–C Bond Activation.
- Byproduct-Free Ketone Alkylation.
- Non-Directed β-Functionalization of Carbonyl Compounds.
- *Exo*-type Directing Group for Site-selective C−H Activation.
- Palladium/Norbornene Catalysis.
- Total Synthesis and Drug Discovery.
- Polymer Chemistry.

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