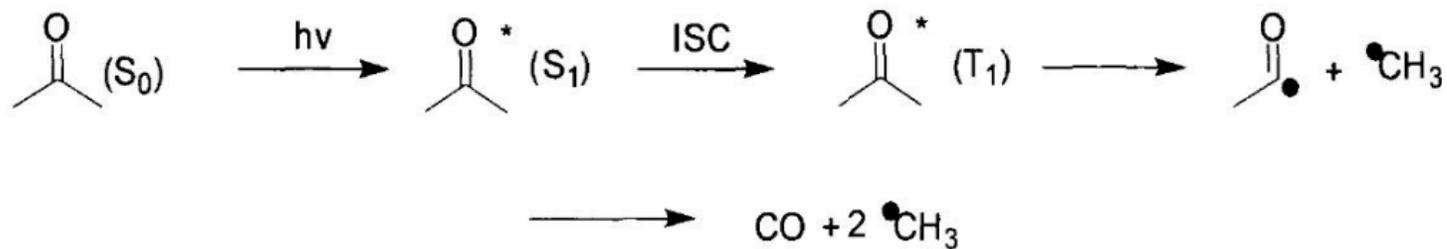


Norrish-杨念祖环化反应

王 岩

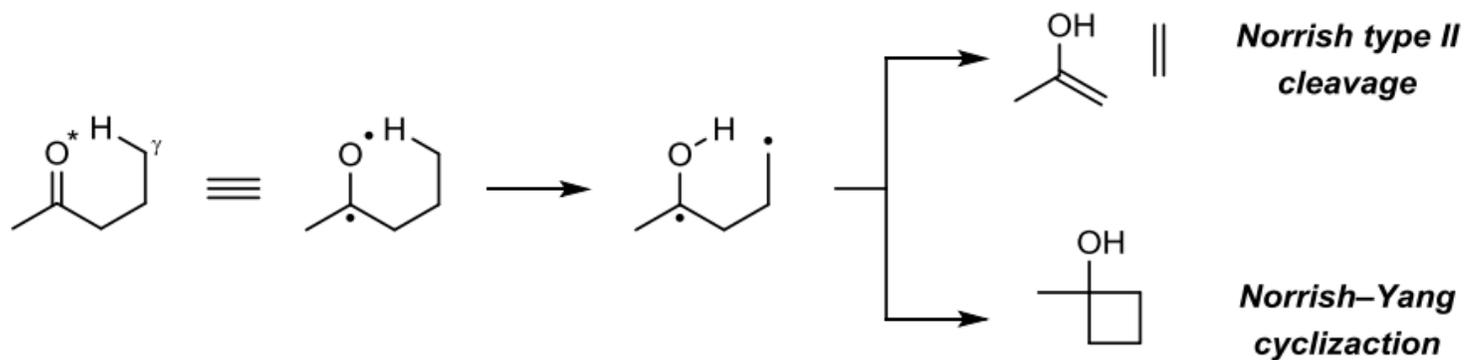
2021/03/30

Norrish type I reaction



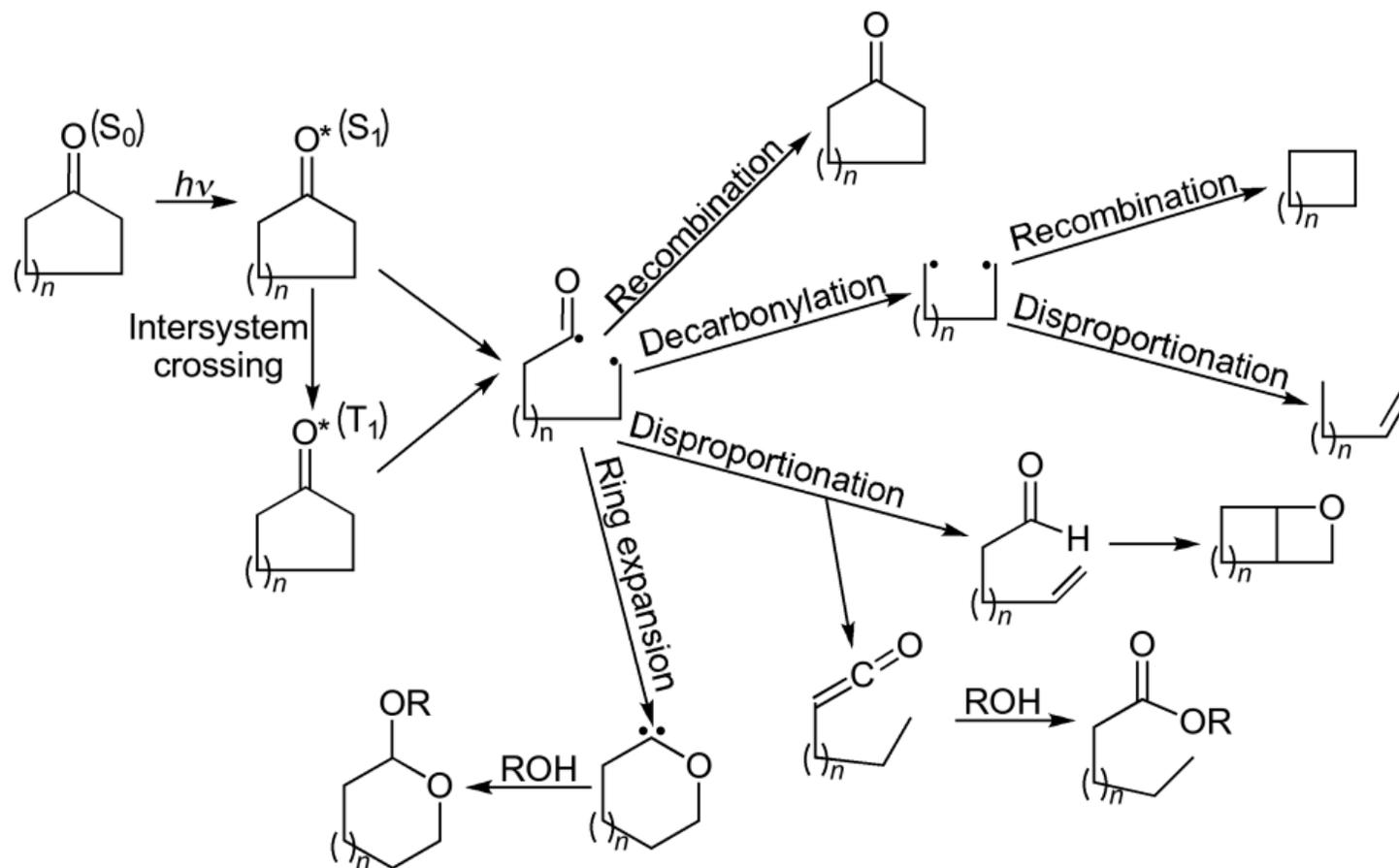
Nature. 1936, 138, 1016.

Norrish type II reaction: Norrish-杨念祖



J. Am. Chem. Soc. 1958, 80, 2913.

Norrish reaction of cyclic ketone





Woodward
A. Frey *Fritz Jader*
R. Kirsten *W. Nickel*
CONGRATULATIONS!
Klaus-Peter Ligg *K. Wiehe*
L. Bickel *Dodai Dyer*
W. H. C. ... *W. S. ...*
Edwin Sexton *Chad ...*
T. Polyzos

1928年5月1日出生于上海。

1948年毕业于上海圣约翰大学化学系，获得理学学士学位，同年赴美国留学。

1952年，获得美国芝加哥大学哲学博士学位。

1952-1955年在MIT的Burge Büchi组进行研究。

1955-1956年间转至哈佛大学R. B. Woodward门下从事博士后研究，参与了Calycanthine的研究。

1956年，芝加哥大学化学系，助理教授。

1961年，芝加哥大学化学系副教授。

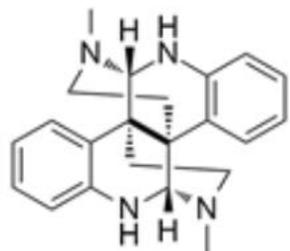
1963年，晋升为教授。

1979年，获聘为中国科学院感光研究所名誉教授。

1980年，获聘为中国科学院上海有机化学所学术委员会委员。

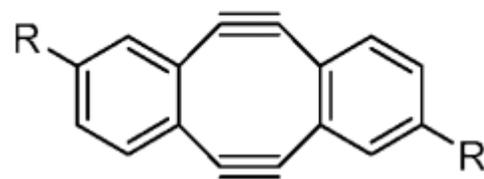
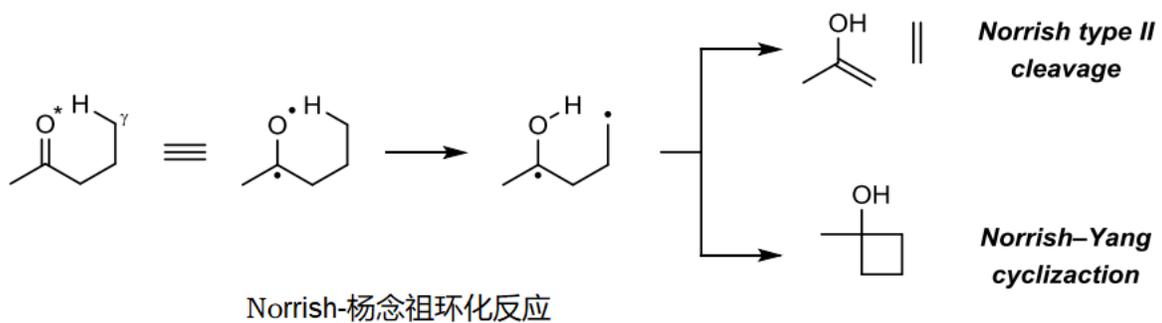
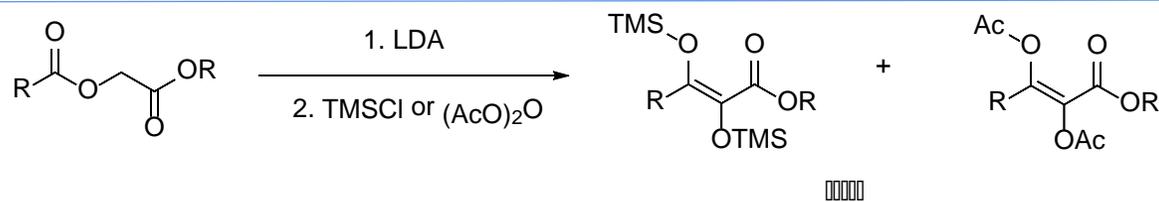
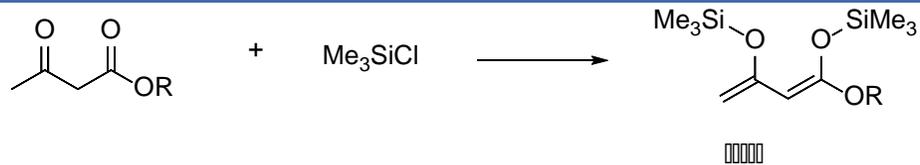
2000年，成为芝大荣休教授。

2008年10月14日，因病逝世于美国芝加哥。



D: (-)-calycanthine

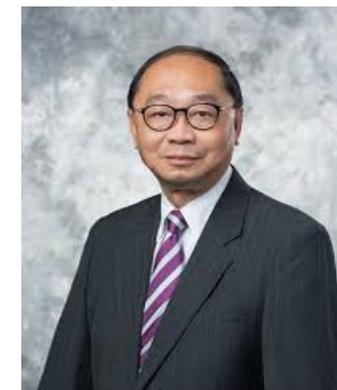
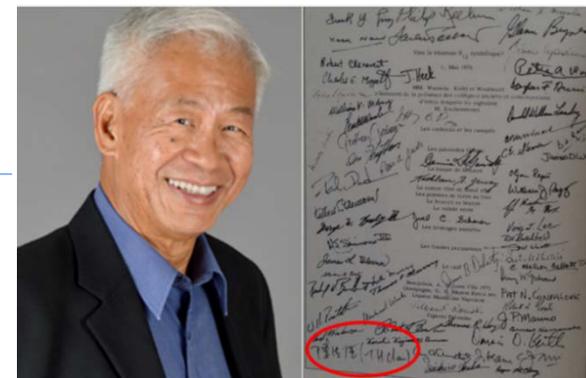
Introduction



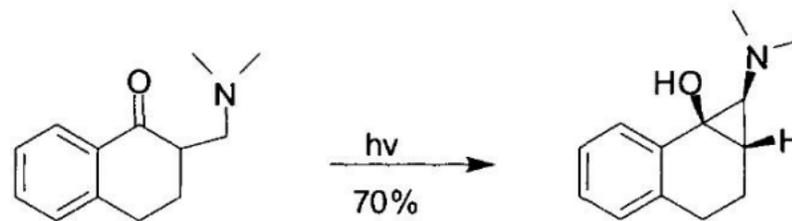
Sondheimer-黄乃正 diyne



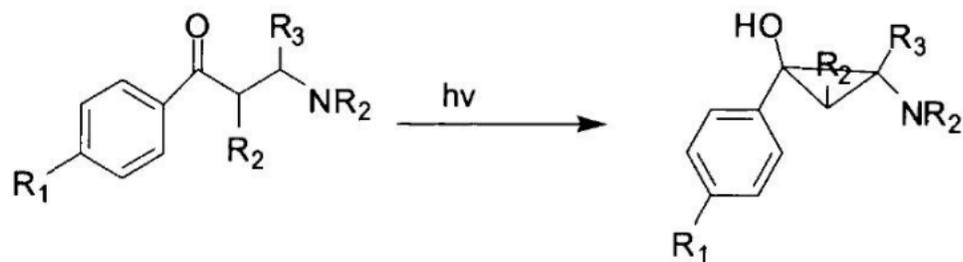
R. B. Woodward



Three-membered ring synthesis

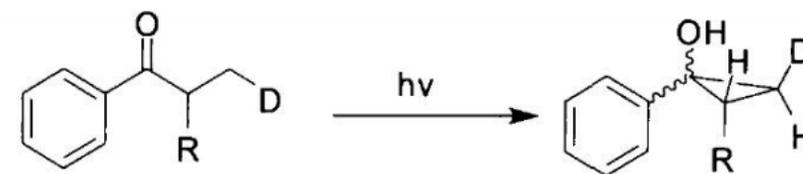


Tetrahedron Lett. 1991, 32, 7151.



$R_1 = \text{H, OH}$
 $R_2 = \text{Me, PhCH}_2, \text{Ph,}$
 $R_3 = \text{p-NC-C}_6\text{H}_4, \text{Ph, p-MeO-C}_6\text{H}_4$

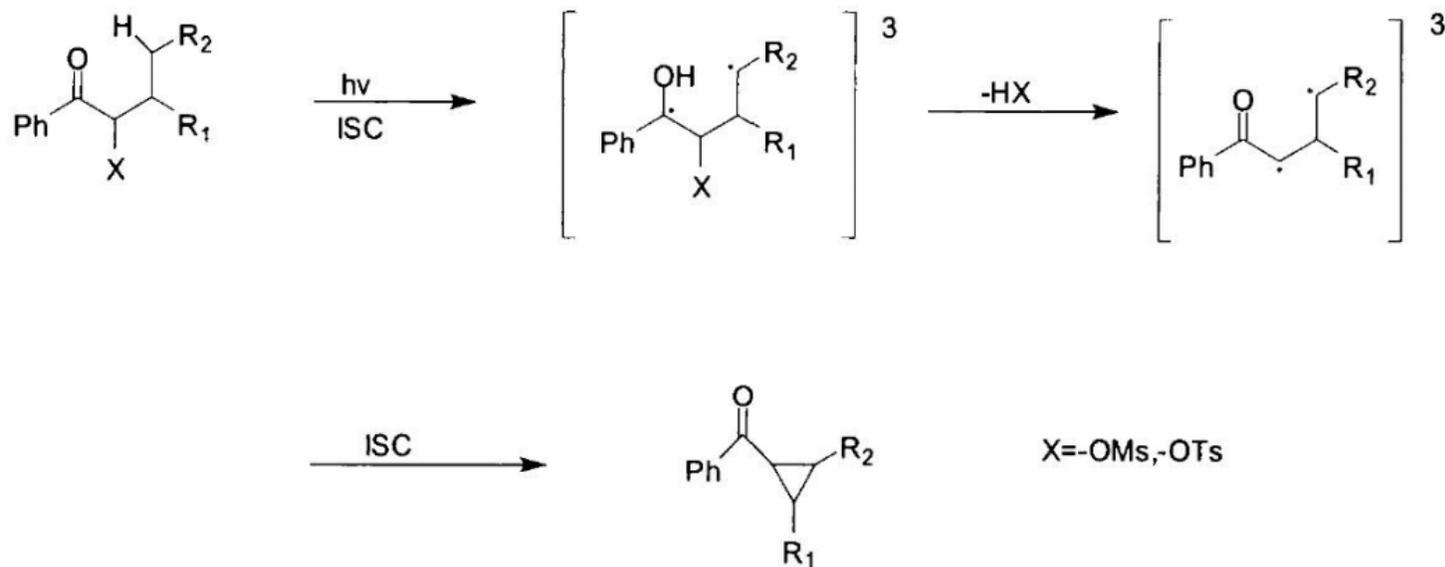
Tetrahedron. 1997, 53, 7855.



$R = \text{H, Ph, PhCH}_2$
 $D = \text{NMe}_2, \text{p-Me}_2\text{-Ph, p-MeO-Ph}$

J. Am. Chem. Soc. 1996, 118, 12858.

Three-membered ring synthesis



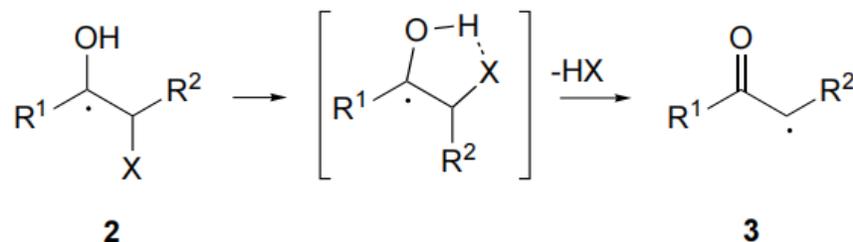
Photobiol. Sci. 2006, 5, 1000.

Helv. Chim. Acta. 2003, 86, 865.

Synthesis 2001, 1258.

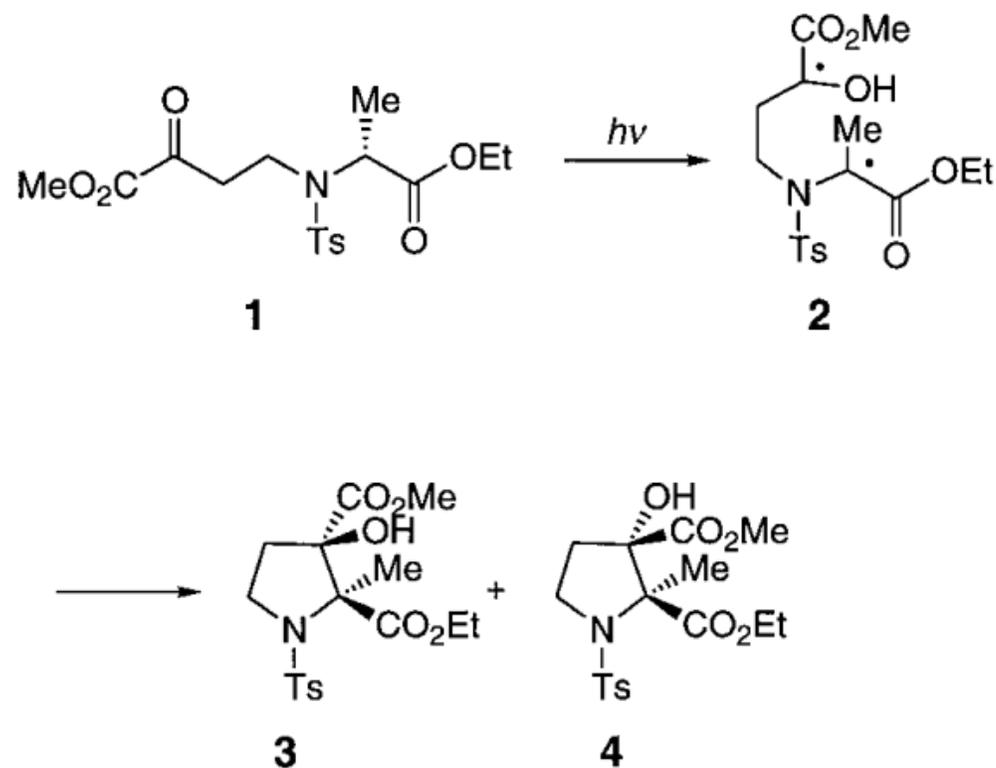
J. Org. Chem. 2004, 69, 7582.

Synthesis 2006, 1543.

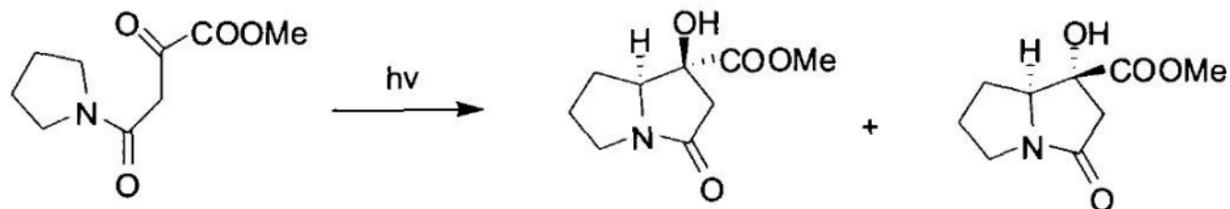


Angew. Chem. 2001, 113, 1099.

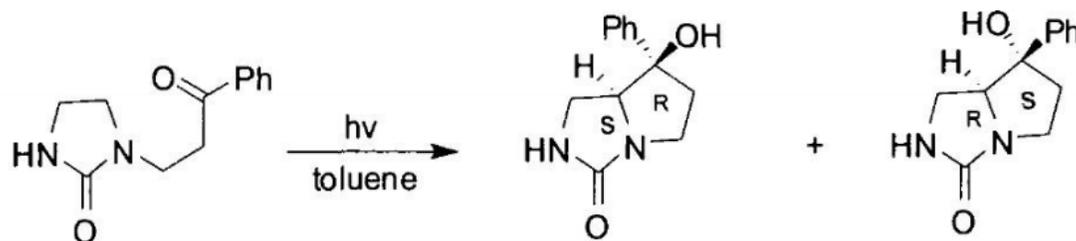
Five-membered ring synthesis



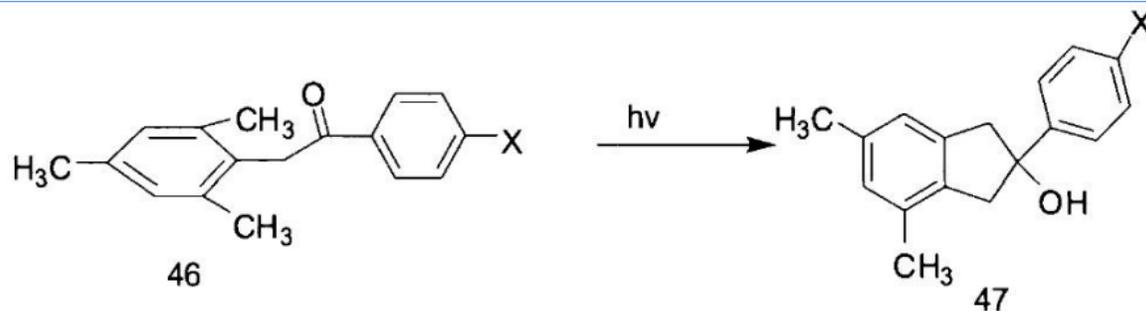
Five-membered ring synthesis



J. Nat. Prod. 1991, 54, 1062.



Chem. Eur. J. 2002, 8, 2464.



Tetrahedron Lett. 1999, 40, 8733.

J. Am. Chem. Soc. 1991, 113, 9630.

a, X=H b, X=COOH c, X=COOCH₃

⊖ ⊕

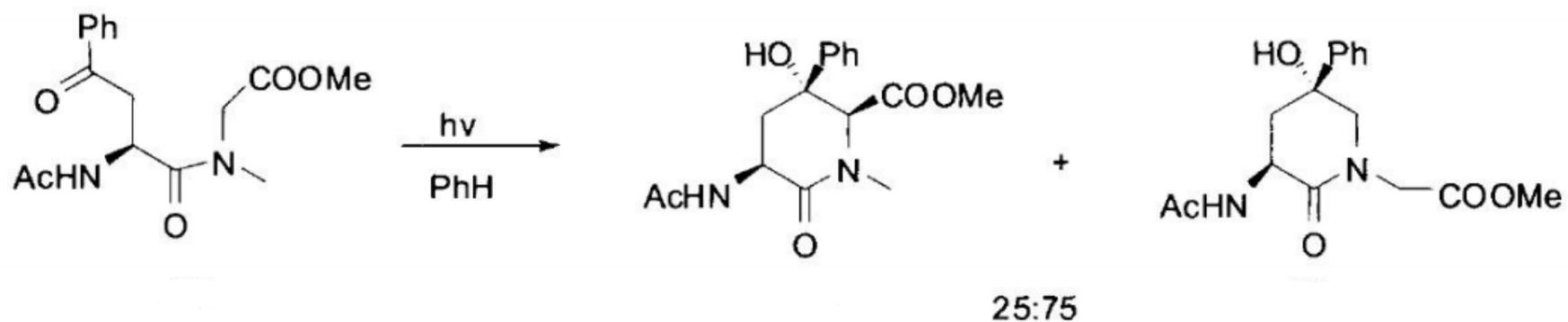
d-f X=COOH₃N-R*

d R*=(S)-(-)-α-methylbenzylamine

e R*=(R)-(+)-α,4-dimethylbenzylamine

f R*=(1S,2R)-(+)-norephedrine

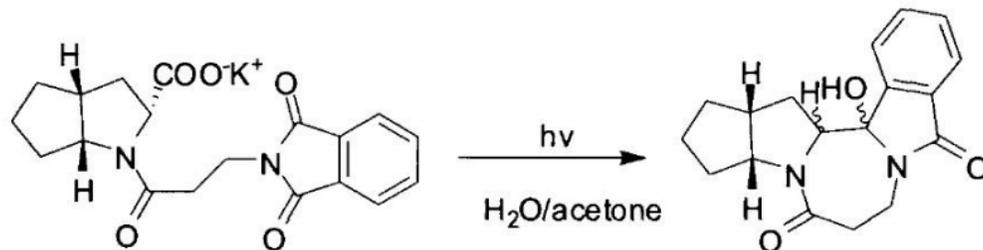
Six-membered ring synthesis



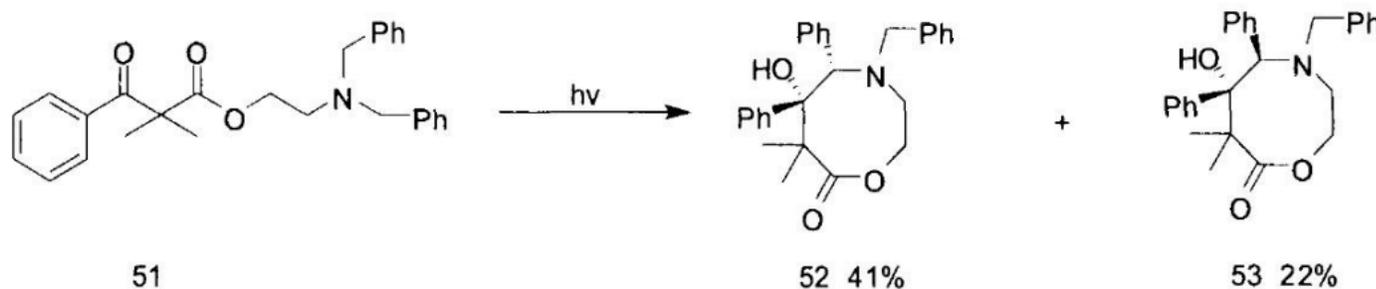
Tetrahedron Lett. 1999, 40, 3137.

Applications in ring construction

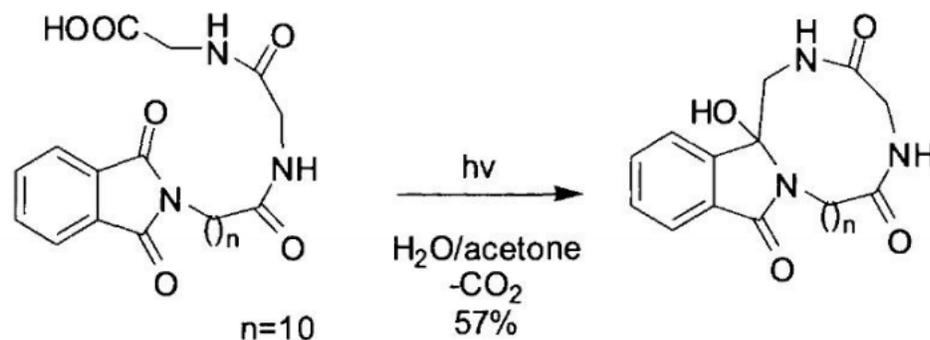
Bigger than six-membered ring synthesis



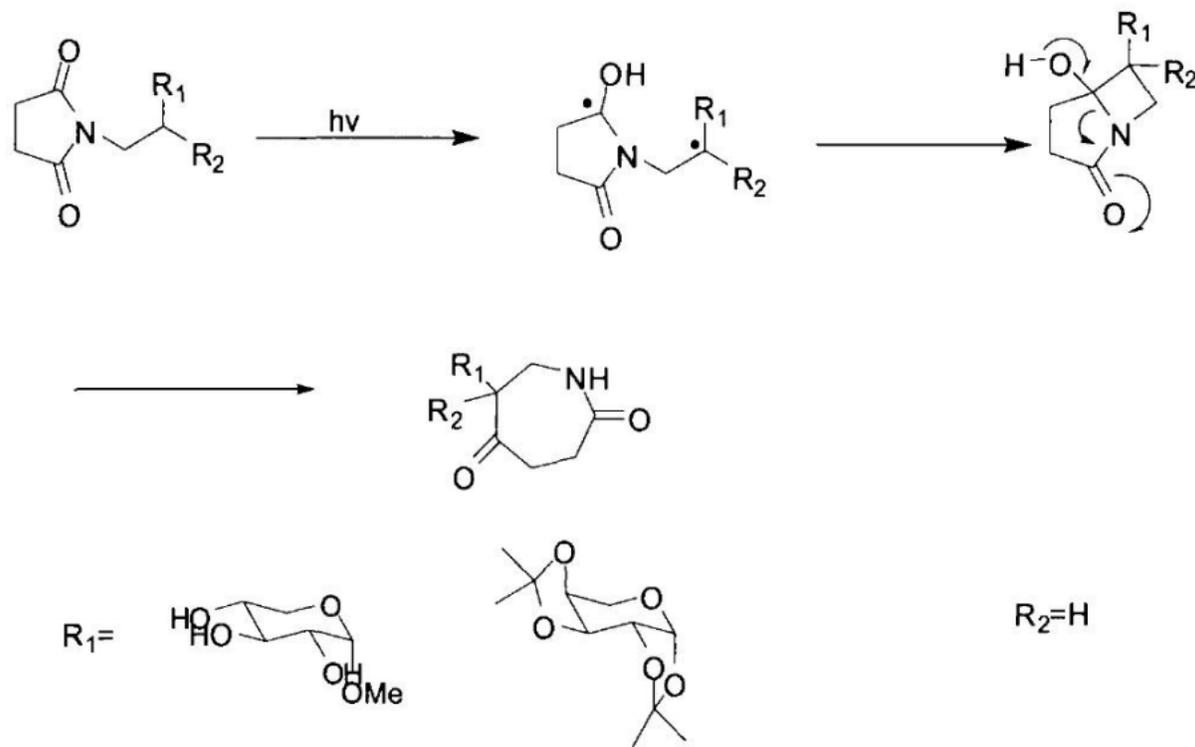
Org. Lett. 2001, 3, 537.



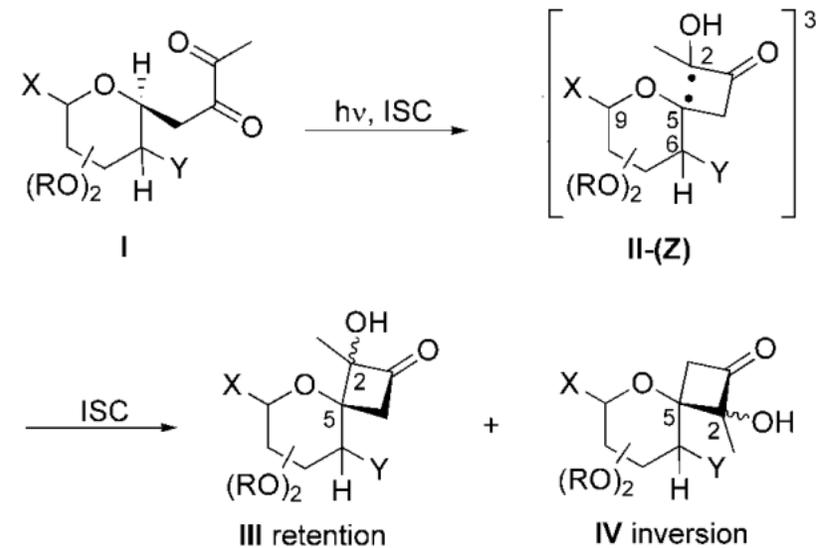
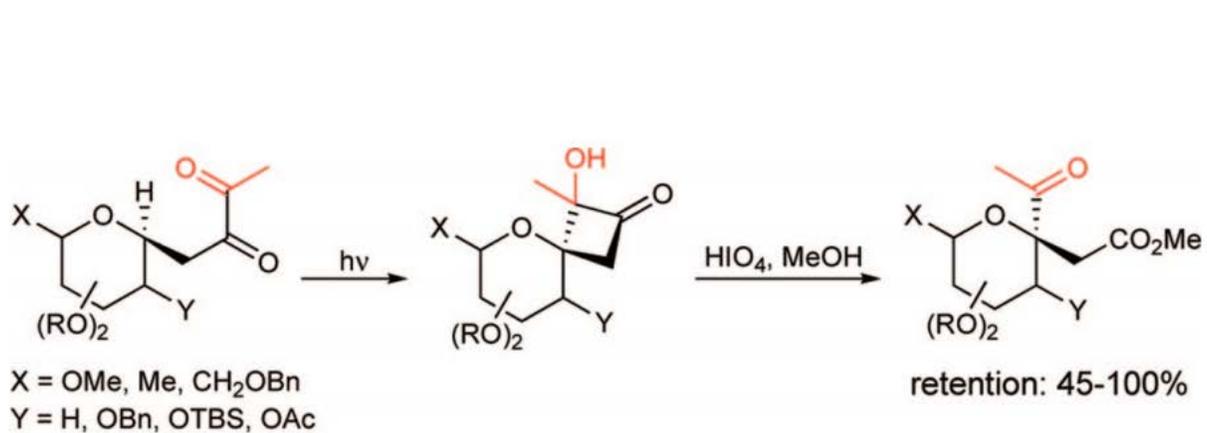
J. Chem. Soc. Perkin. Trans. I
2001, 3, 537.



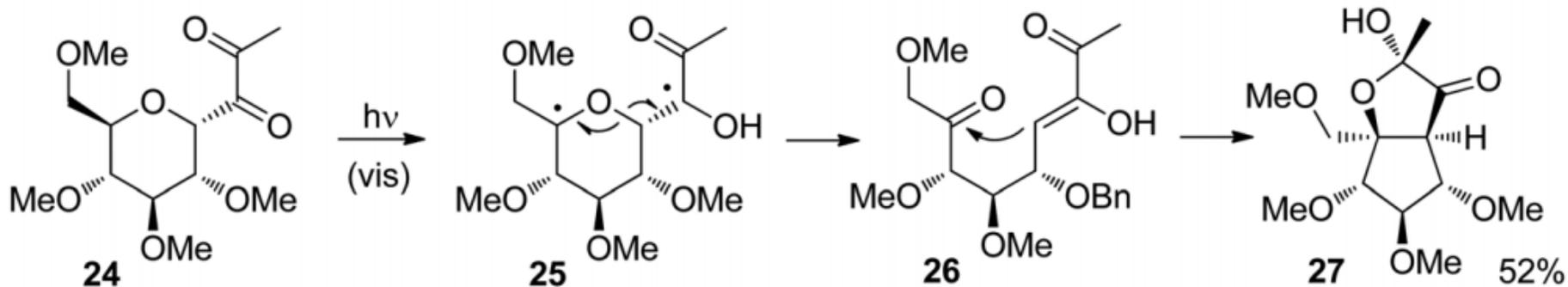
J. Am. Chem. Soc. 2002, 124, 1052.



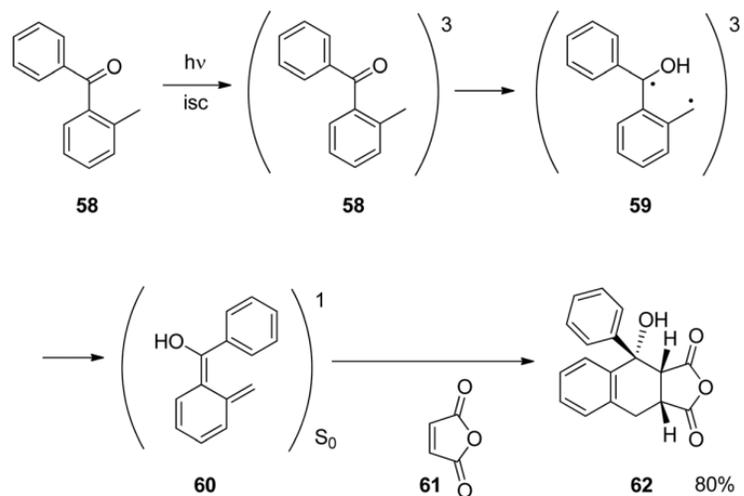
Carbohydrate Research 2006, 341, 1543.



J. Org. Chem. 2008, 73, 3384-3391.

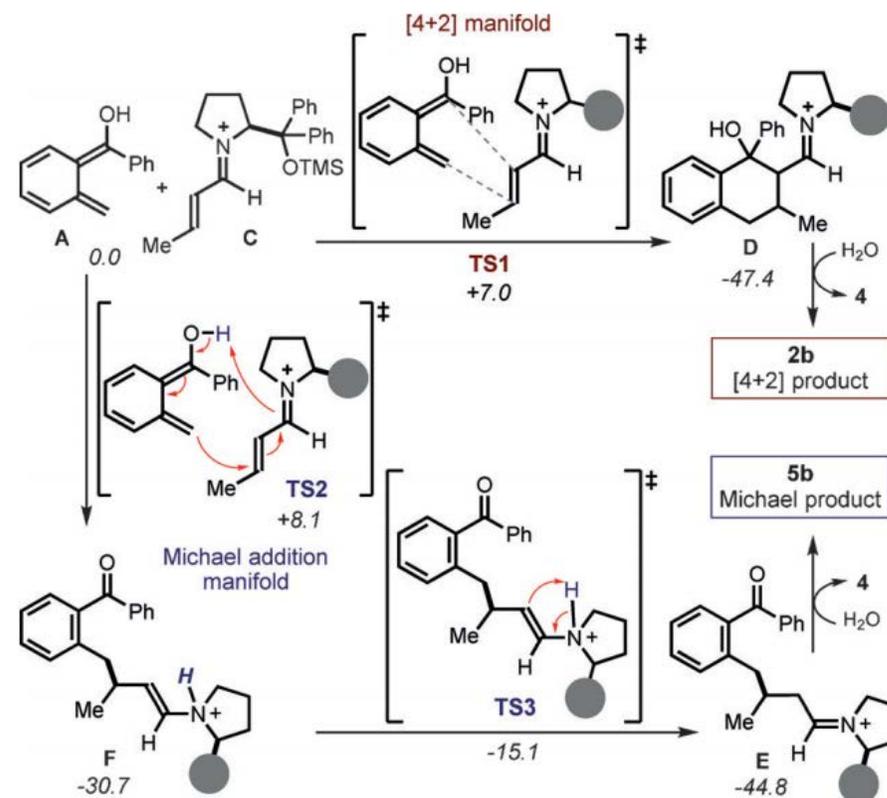
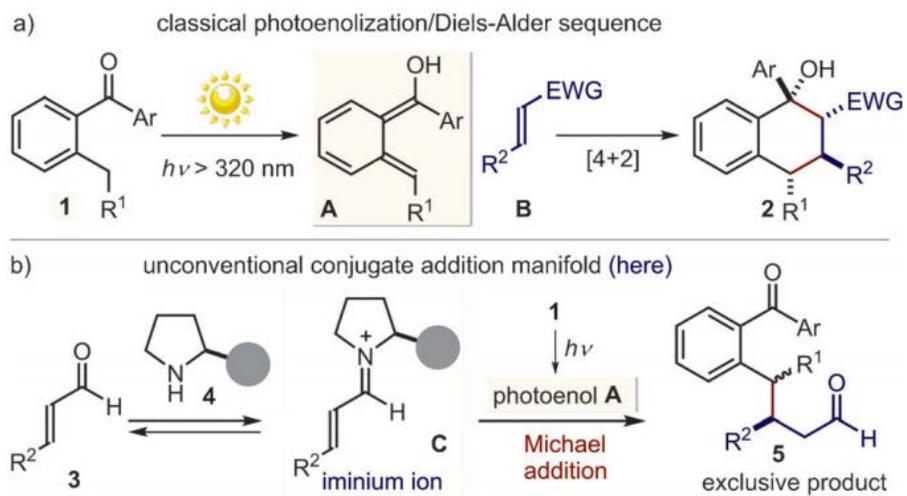


Angew. Chem., Int. Ed., 2008, 47, 8917-8919.



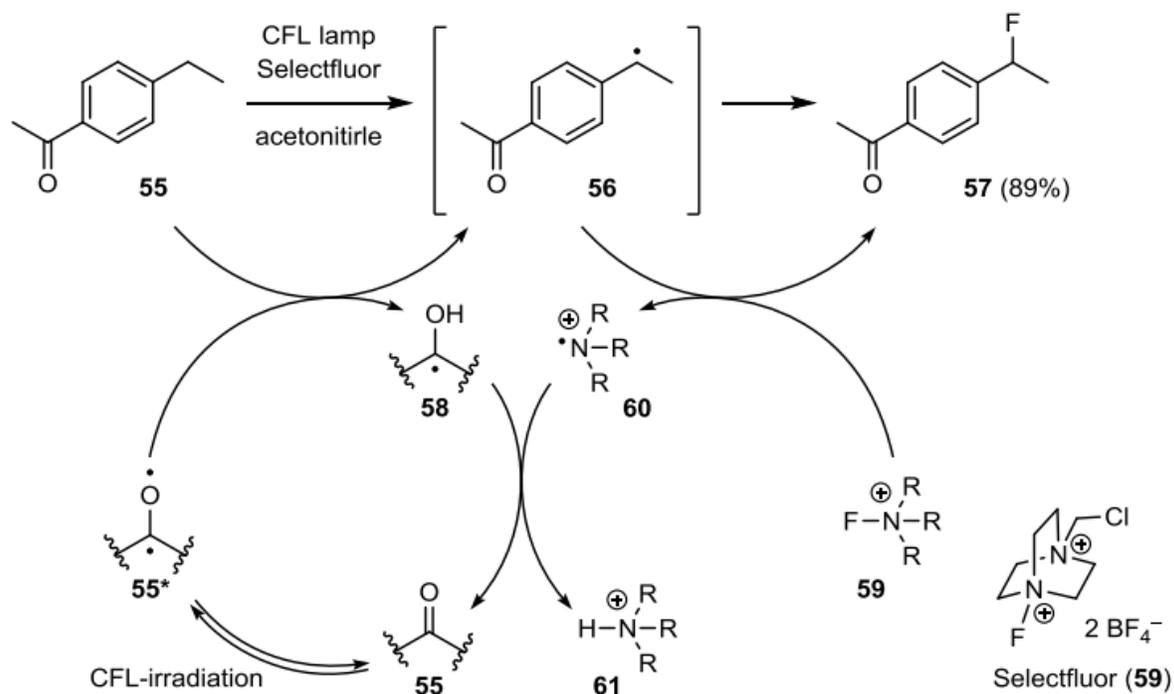
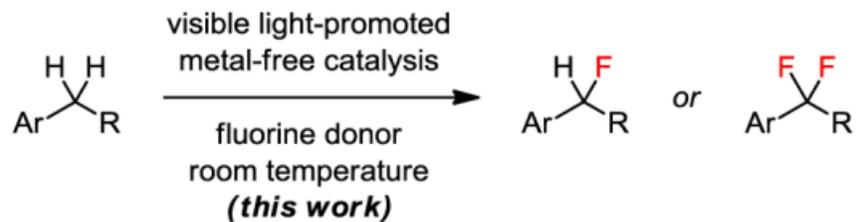
Chem. Ber., 1968, 101, 1398-1406.

Tetrahedron, 1978, 34, 3459-3468.



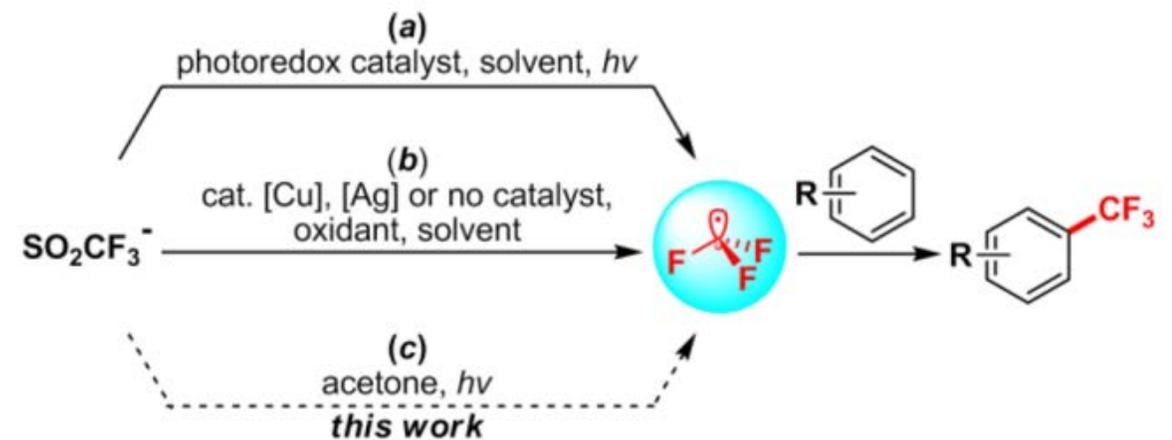
J. Am. Chem. Soc., 1987, 109, 4743-4745.

C-H Activation

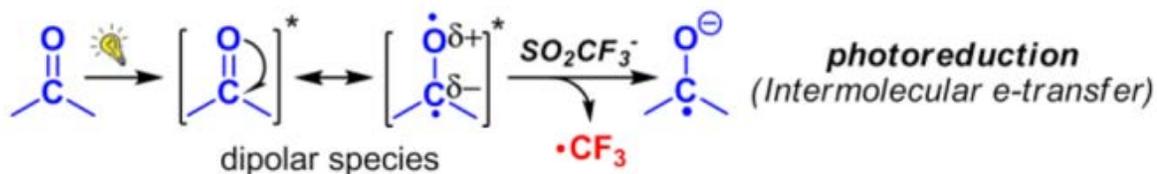


J. Am. Chem. Soc., 2013, 135, 17494.

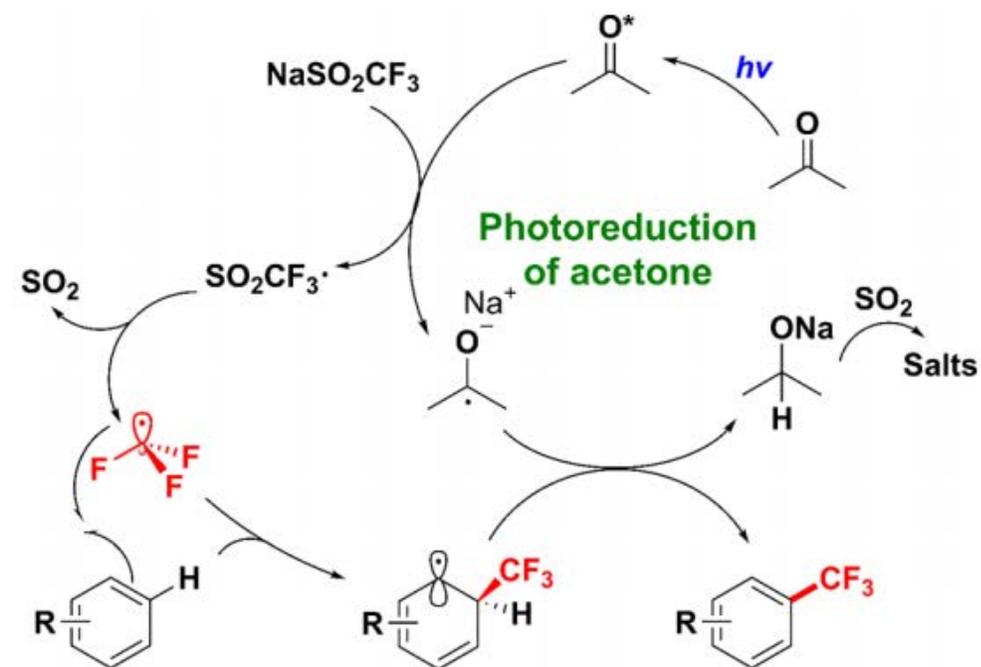
C-H Activation



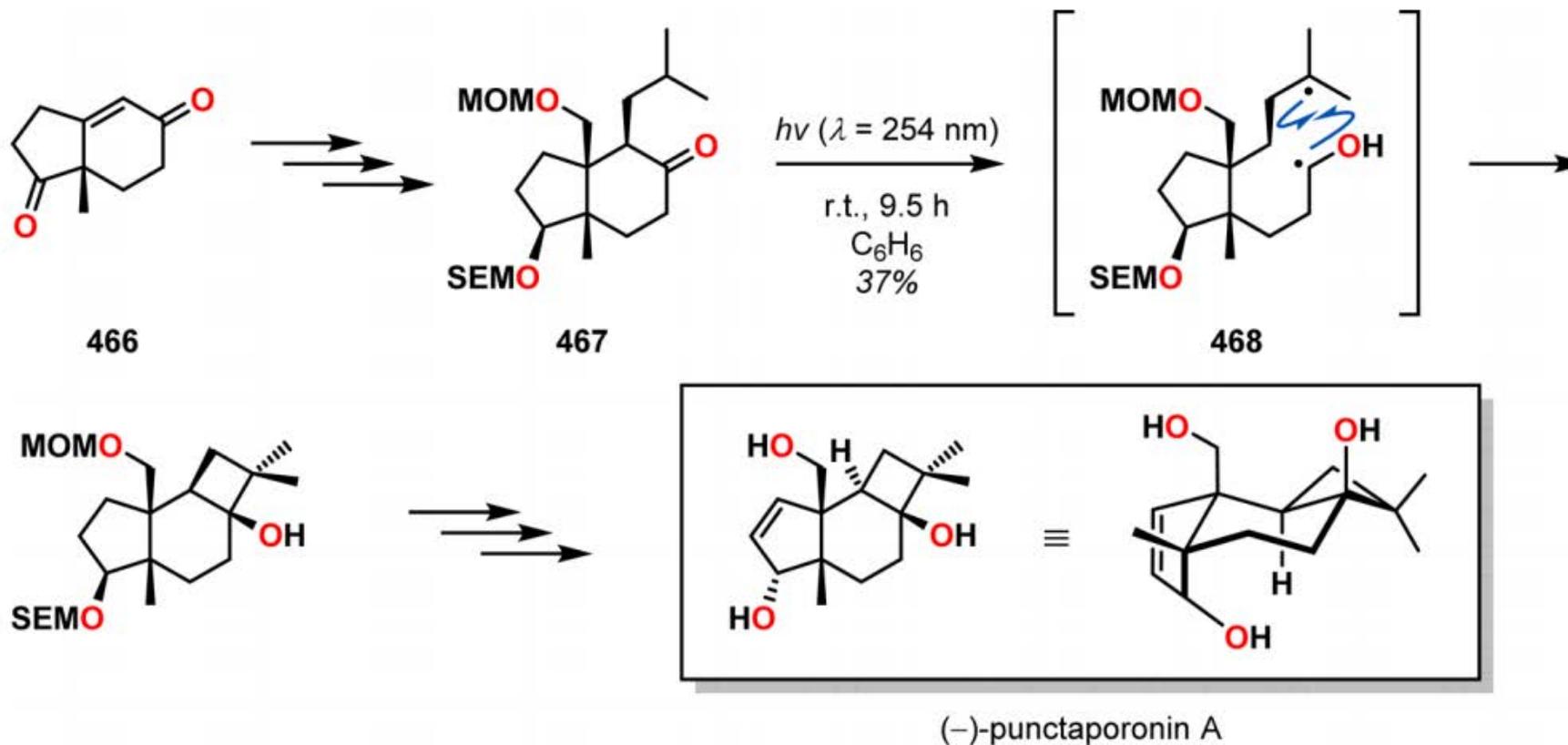
Proposed pathway



- ◆ transition metal and oxidant free
- ◆ solid CF_3 reagent and room temperature
- ◆ broad substrate scope
- ◆ gram scale reaction

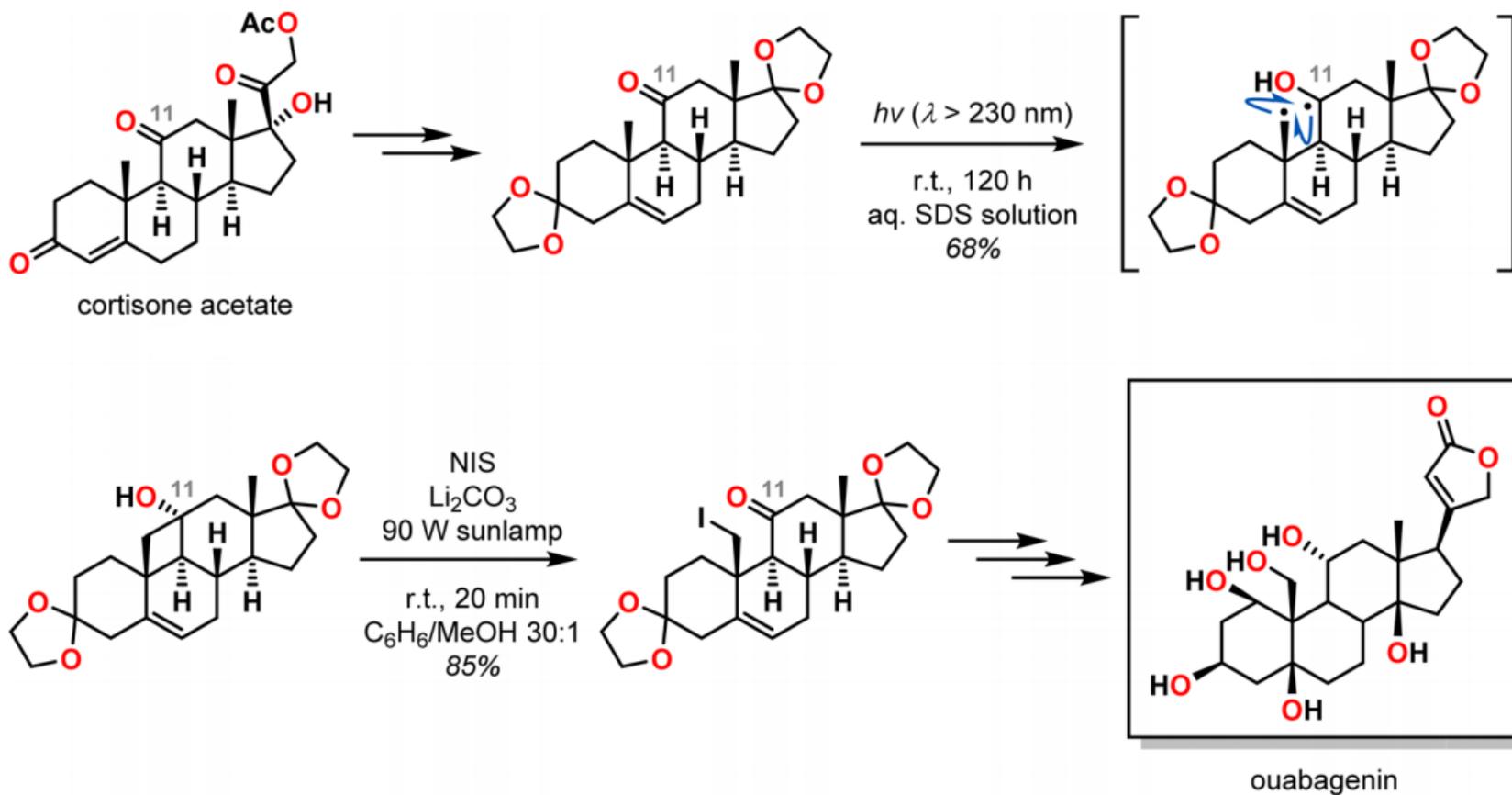


Total synthesis of Punctaporonin A



J. Am. Chem. Soc., 1987, 109, 3017–3024.

Total synthesis of Ouabagenin



感谢