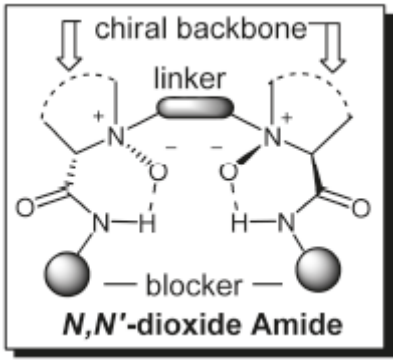
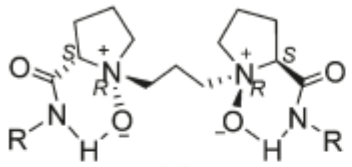
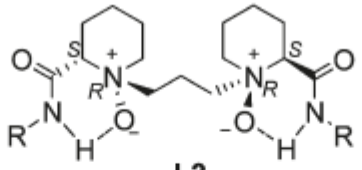
# 冯小明手性氮氧配体



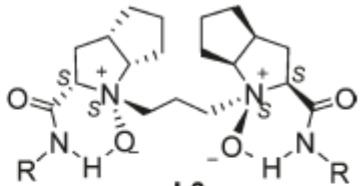
L1

| L1 | R |
|---|---|
| L1a | cyclohexyl |
| L1b | cyclopentyl |
| L1c | Ph |
| L1d | 4-$BrC_6H_4$ |
| L1e | 2,6-$Me_2C_6H_3$ |
| L1f | 2,6-*i*$Pr_2C_6H_3$ |



L2

| L2 | R |
|---|---|
| L2a | cyclopentyl |
| L2b | 1-adamantyl |
| L2c | $C_6H_5CH_2$ |
| L2d | $C_6H_5(CH_2)_2$ |
| L2e | 2-$BrC_6H_4$ |
| L2f | 2,6-*i*$Pr_2C_6H_3$ |
| L2g | Ph |
| L2h | 2,4,6-trimethylphenyl |



L3

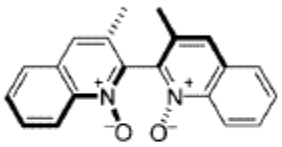
| L3 | R |
|---|---|
| L3a | $C_6H_5CH_2$ |
| L3b | $Ph_2CH$ |
| L3c | cyclopentyl |
| L3d | Ph |
| L3e | 2,6-$Me_2C_6H_3$ |
| L3f | 2,6-*i*$Pr_2C_6H_3$ |
| L3g | 3-anthracenylmethyl |

# *FIGURE*

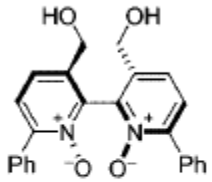
- 冯小明：中国科学院院士，四川大学化学系教授，博士生导师，有机化学家。
- 1981-1985年兰州大学，学士学位
- 1985-1988年兰州大学，硕士学位（Prof. Ziyi Zhang）
- 1993-1996年中科院化学所，博士学位（Prof. Zhitang Huang & Yao-Zhong Jiang）
- 1988-1993年西南师范大学化学系，历任助教和副教授
- 1997-2000年中科院成都有机所，任副研究员和研究员，不对称合成联合开放实验室副主任，于1999被评聘为博士生导师
- 1998-1999年美国Colorado State University化学系，博士后（Prof. Yian Shi）
- 2000-至今 四川大学化学系教授，博士生导师
- 2013年 当选中科院院士
- 2014年当选英国皇家化学会会士
- 2020年当选中国化学会创始会士

# *BACKGROUND*

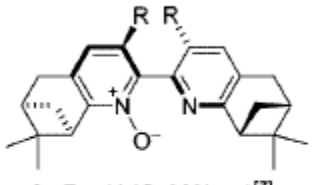
Scheme 1. Asymmetric allylation of aldehydes.



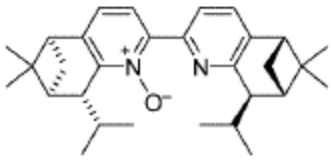
**4** (*R*, 88% *ee*)[5]



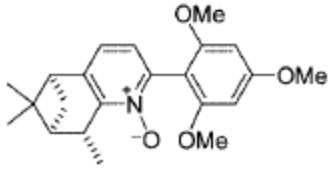
**5** (*S*, 84% **ee**)[6]



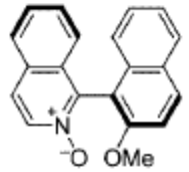
**6**, R = H (*S*, 90% **ee**)[7]
**7**, R = Me (*S*, 98% **ee**)[7]



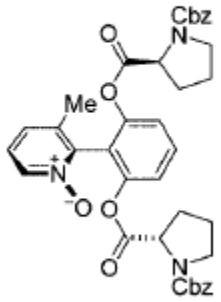
**8** (*S*, 97% *ee*)[7]



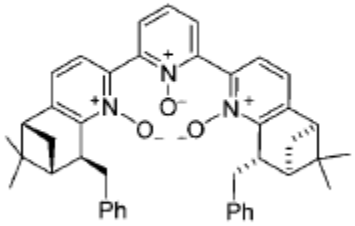
**9** (*S*, 96% *ee*)[8b]



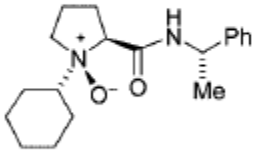
**10** (*R*, 89% *ee*)[9]



**11** (*S*, 68% **ee**)[10]

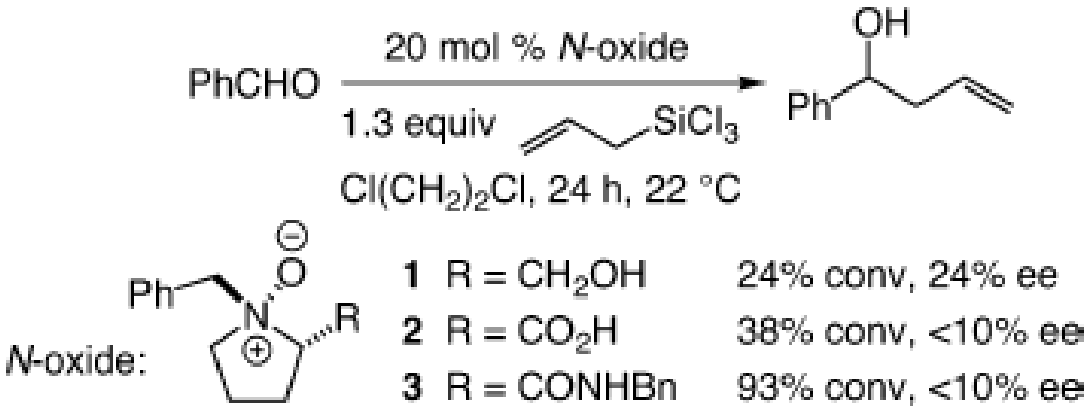


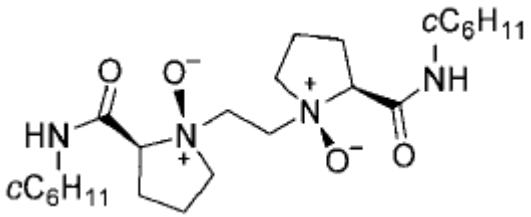
**12** (*R*, 86% **ee**)[11]



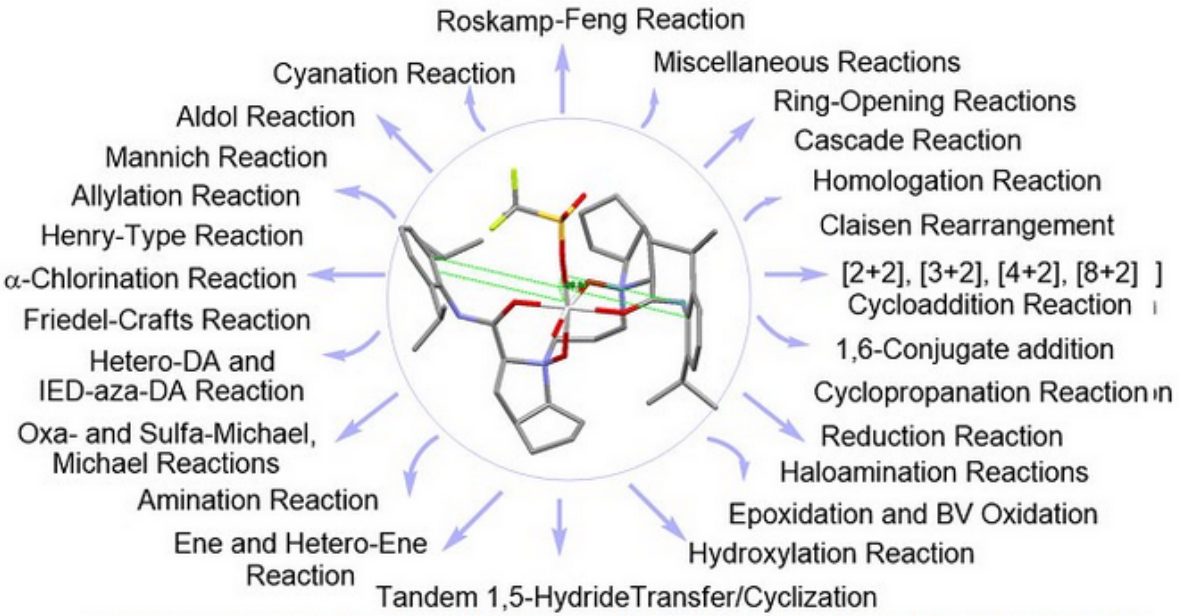
**13** (*R*, 87% *ee*)[12]

**Scheme 1.** Allylation Reactions Promoted by *N*-Oxides **1**–**3**

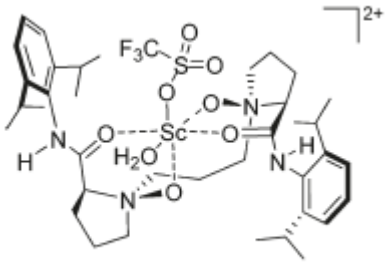


# *FEATURE*


Roskamp-Feng Reaction
Miscellaneous Reactions
Cyanation Reaction
Ring-Opening Reactions
Aldol Reaction
Cascade Reaction
Mannich Reaction
Homologation Reaction
Allylation Reaction
Claisen Rearrangement
Henry-Type Reaction
[2+2], [3+2], [4+2], [8+2] ]
α-Chlorination Reaction
Cycloaddition Reaction
Friedel-Crafts Reaction
1,6-Conjugate addition
Hetero-DA and
IED-aza-DA Reaction
Cyclopropanation Reaction
Oxa- and Sulfa-Michael,
Michael Reactions
Reduction Reaction
Haloamination Reactions
Amination Reaction
Epoxidation and BV Oxidation
Ene and Hetero-Ene
Reaction
Hydroxylation Reaction
Tandem 1,5-HydrideTransfer/Cyclization
Metal ions : $Mg^{2+}$, $Sc^{3+}$, $Ti^{4+}$, $Fe^{3+}$, $Fe^{2+}$, $Co^{3+}$, $Co^{2+}$, $Ni^{2+}$, $Cu^{2+}$, $Cu^{+}$, $Zn^{2+}$, $Y^{3+}$, $Nb^{3+}$, $Ag^{+}$, $In^{3+}$, $La^{3+}$, $Ce^{3+}$, $Pr^{3+}$, $Nd^{3+}$, $Sm^{3+}$, $Er^{3+}$, $Gd^{3+}$, $Dy^{3+}$, $Yb^{3+}$, $Lu^{3+}$, etc.

# *MECHANISM*




b) **L1**f-Sc(III) complex

**Scheme 1** Substrate scope for the aza-ene-type reaction.

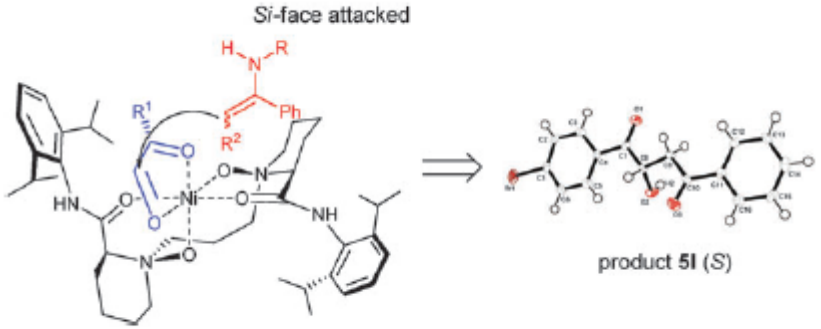



**Fig. 2** Proposed transition-state and the X-ray crystallographic structure of the (*S*)-product **5l**.

- ***APPLICATION***

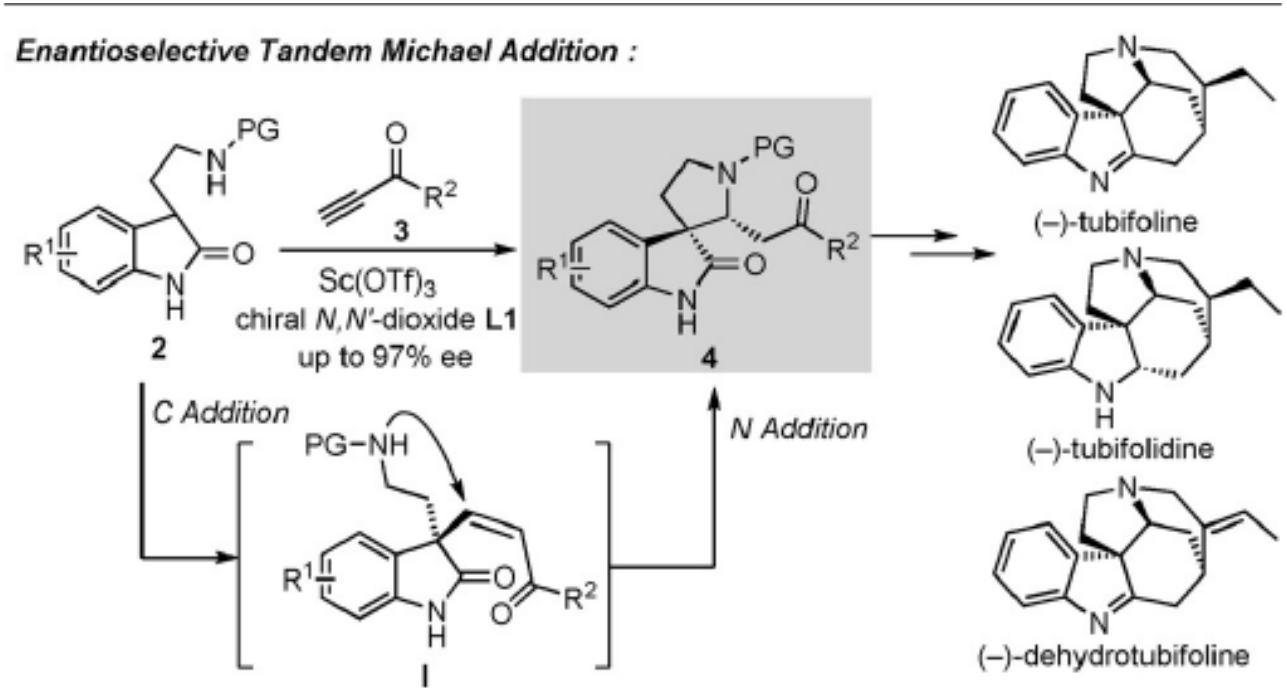



***Figure 1.*** Monoterpenoids incorporating a spiro[pyrrolidine-3,3′-oxindole scaffold and enantioselective tandem michael addition that enables asymmetric synthesis of strychnos alkaloids.

***THANKS FOR YOUR ATTENTION !***