



# 2022「中技社科技獎學金」

2022 CTCI Foundation Science and Technology Scholarship

## 境外生研究獎學金

Research Scholarship for International Graduate Students



### Gold Catalyzed Organic Transformations for the Synthesis of Highly Functionalized Organic Frameworks

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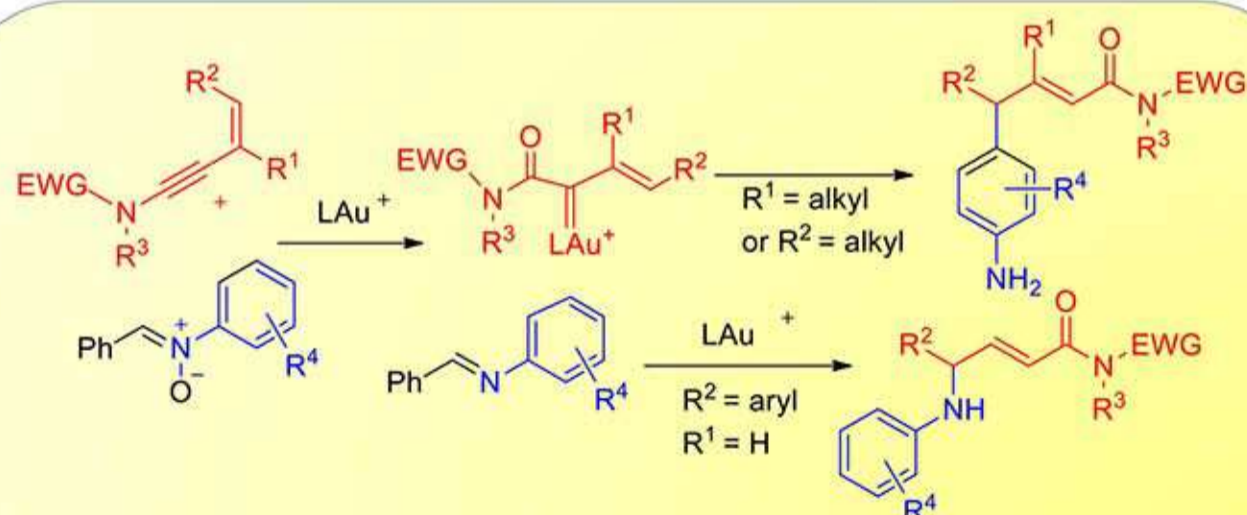


#### Abstract

This dissertation describes the development of new synthetic organic transformations by using gold catalysts. The first chapter describes the Gold(I)-Catalyzed Oxidative 1,4-Additions of 3-En-1-ynamide with Nitrones via Carbon- versus Nitrogen-Addition Chemoselectivity. The second chapter deals with Gold-catalyzed [4+3]-annulations of 2-(1-alkynyl)-2-alken-1-ones with substituted cyclopentadiene to yield Bicyclo[3.2.1]oct-6-ene Frameworks products with excellent *exo*-diastereoselectivity ( $dr > 25:1$ ). More importantly, the enantioselective versions of these [4+3]-cycloadditions have been developed with chiral gold catalysts. The third chapter describes “Relay Zn(II)- and Gold(I)-Catalyzed Aziridination/Cyclization/Ring Expansion Sequence to form 3-Benzazepine Derivatives.”

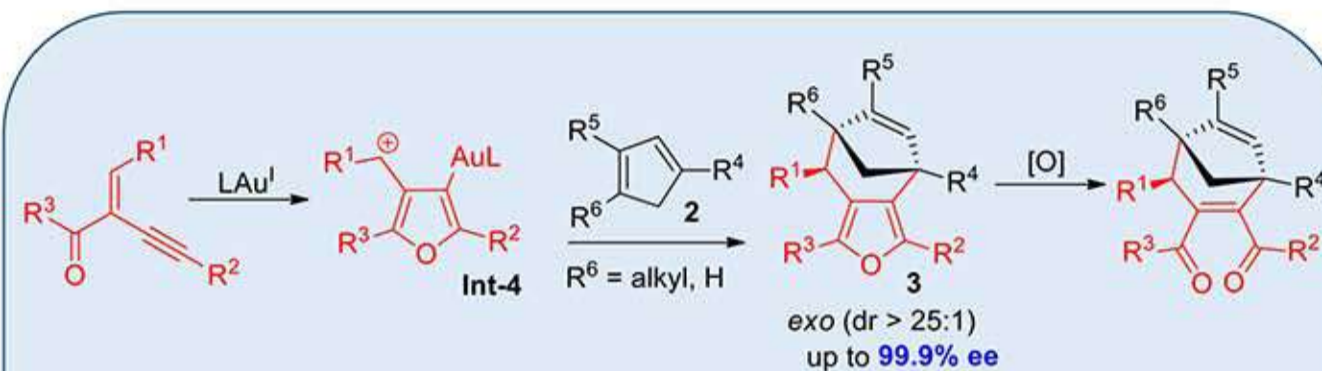
#### Research Work

##### 1. Gold(I)-Catalyzed Oxidative 1,4-Additions of 3-En-1-ynamide with Nitrones via Carbon- versus Nitrogen-Addition Chemoselectivity.



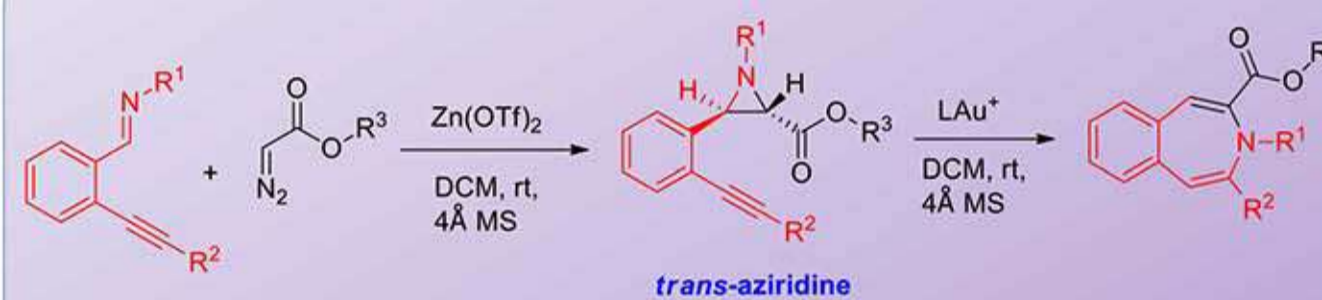
- ✓ Chemoselective reaction
- ✓ Novel 1,4-oxoarylation reaction and 1,4-oxoamination reaction
- ✓ Broad substrate scope

##### 2. Gold(I)-Catalyzed Highly Diastereo- and Enantioselective Constructions of Bicyclo[3.2.1]oct-6-ene Frameworks via (4 + 3)-Cycloadditions



- ✓ Access to biologically important Bicyclo[3.2.1]oct-6-ene products
- ✓ Excellent *exo*-diastereoselectivity ( $dr > 25:1$ )
- ✓ Enantioselective versions have been developed

##### 3. Relay Zn(II)- and Gold(I)-Catalyzed Aziridination/Cyclization/Ring Expansion Sequence to form 3-Benzazepine Derivatives.



- ✓ Access to biologically important Benzazepines products
- ✓ One-pot synthesis of 3H-benzo[d]azepine-2-carboxylate
- ✓ Access *trans*-aziridine product.

#### References

- 1) S. D. Tanpure, B. S. Kale, R.-S. Liu, *Org. Lett.*, 2021, 23, 1394–1399.
- 2) S. D. Tanpure, T.-C. Kuo, M.-J. Cheng, R.-S. Liu, *ACS Catal.* 2022, 12, 536–543.
- 3) S. D. Tanpure, R. D. Kardile, R.-S. Liu, Manuscript Submitted in Advanced synthesis and catalysis.

#### Acknowledgment

Department of Chemistry, National Tsing Hua University, Hsinchu, Taiwan and Ministry of Science and Technology, Taiwan, ROC.



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