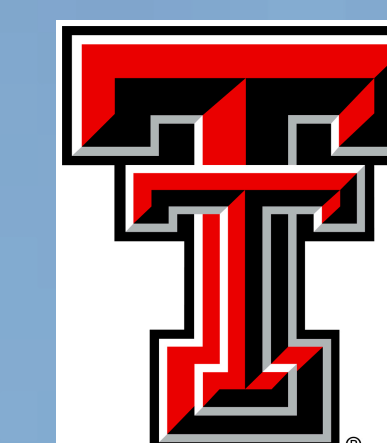


Transient Ligand-Enabled C-H Arylation of Aliphatic Aldehydes

Based on work by: Ke Yang, Bijin Li, Qun Li, Yongbing Liu, Brianna Lawrence, Dr. Guigen Li, and Dr. Haibo Ge.

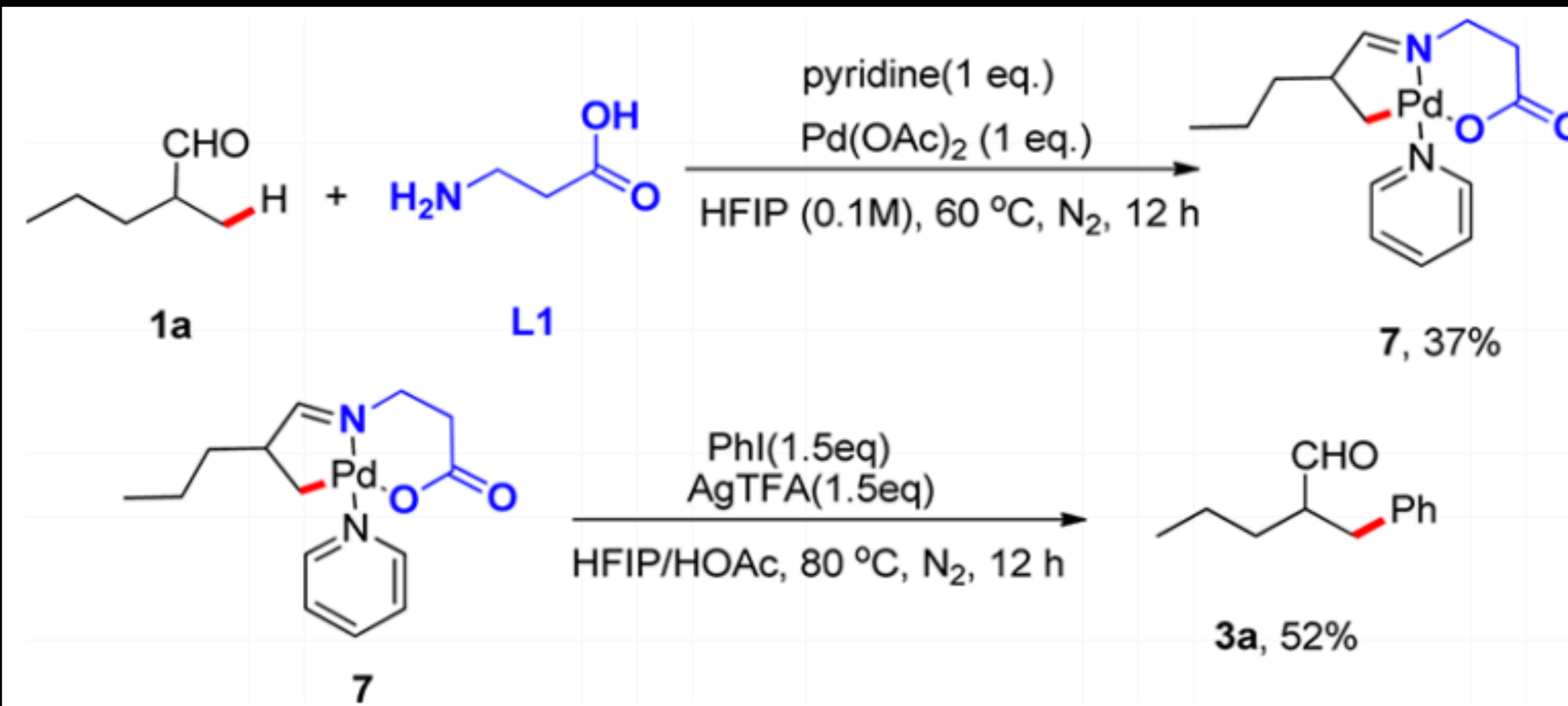


Department of Chemistry & Biochemistry

Introduction

Direct metal-catalyzed C—H bond functionalization is an effective technique used to construct C—C and C—X bonds. Specific C—H bonds could be activated using directing groups because the reactivity of C—H bonds is highly influenced by their proximity to metal centers. In efforts aimed at avoiding the installation and the subsequent removal of the directing groups in these transformations, a more direct transient ligand-enabled strategy has been developed. The fine-tuning and the proper selection of the reaction additives could enable the desired transformations in fewer steps and higher efficiency.

Exploring reaction mechanism



Mechanism and fluorescence experiments

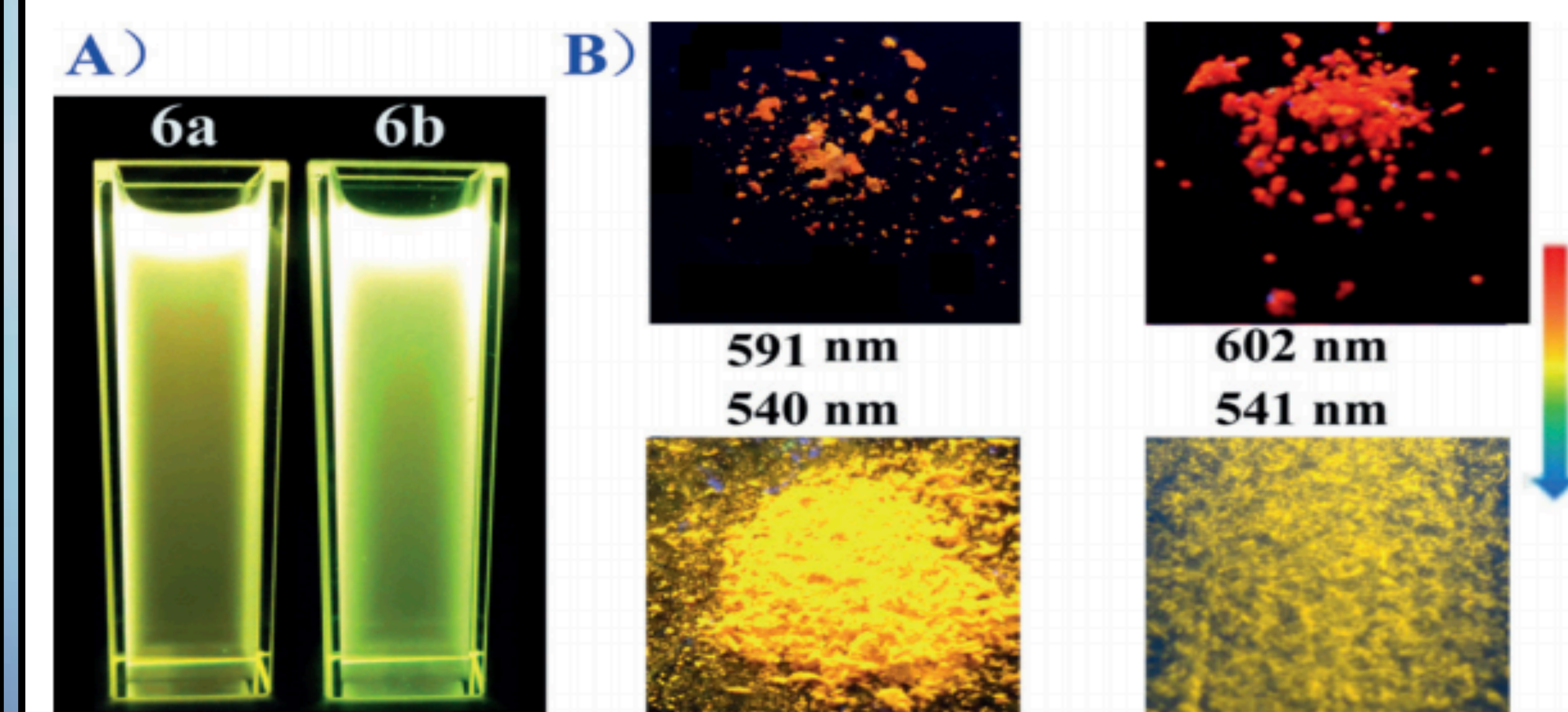
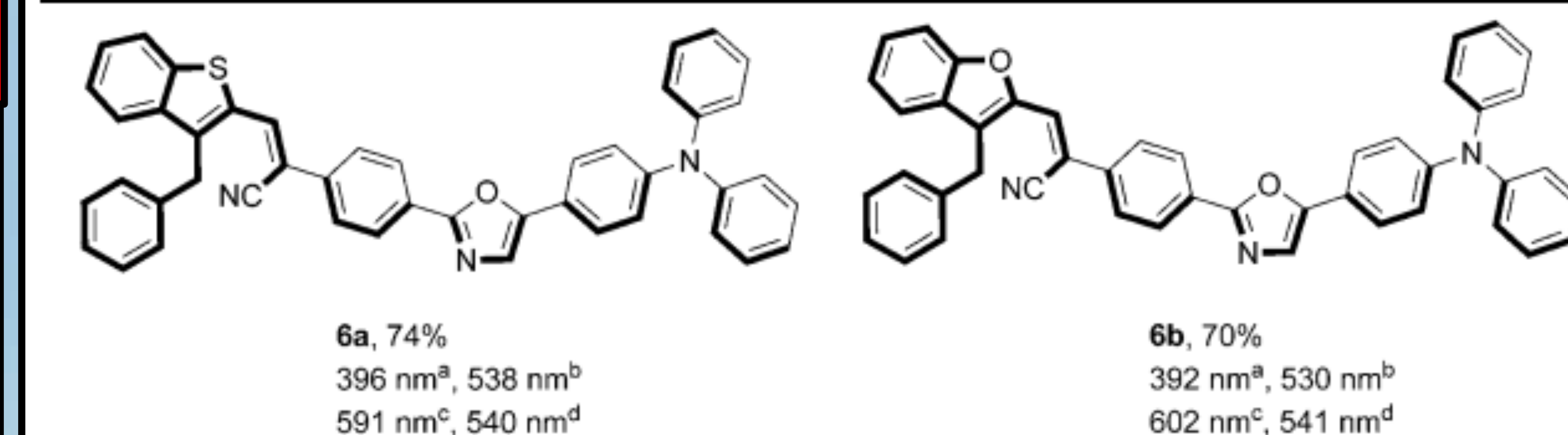
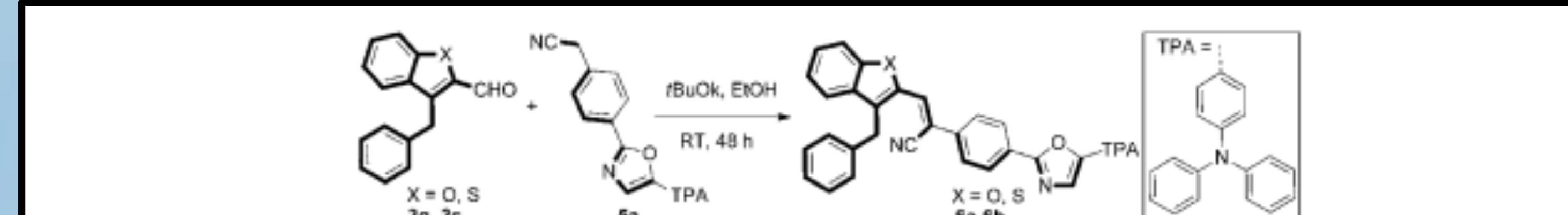
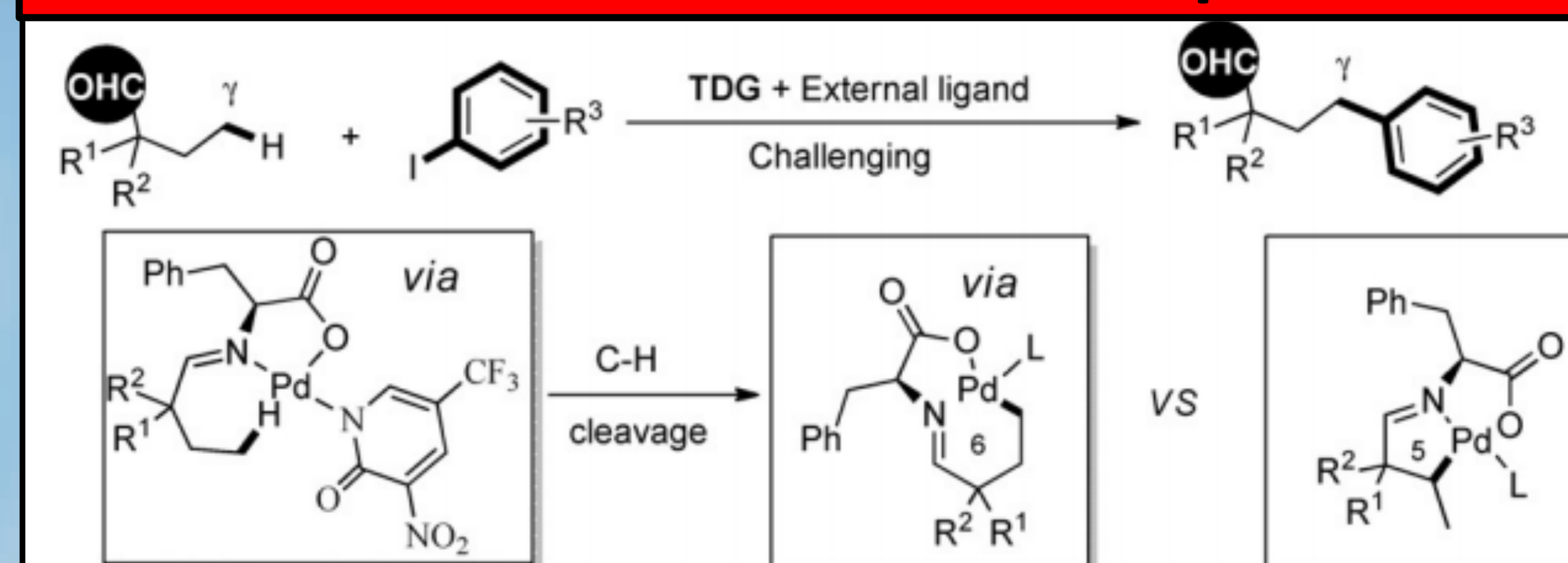
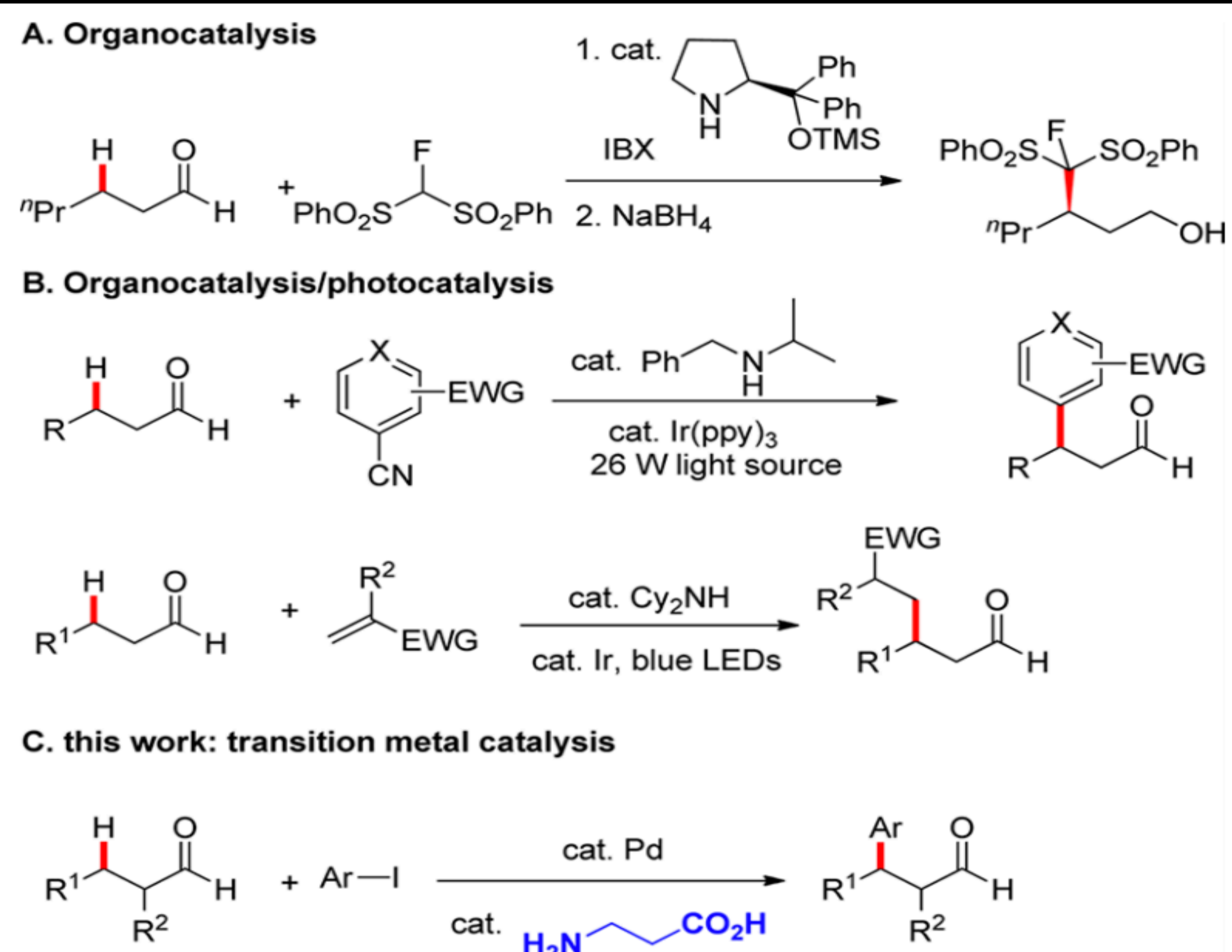
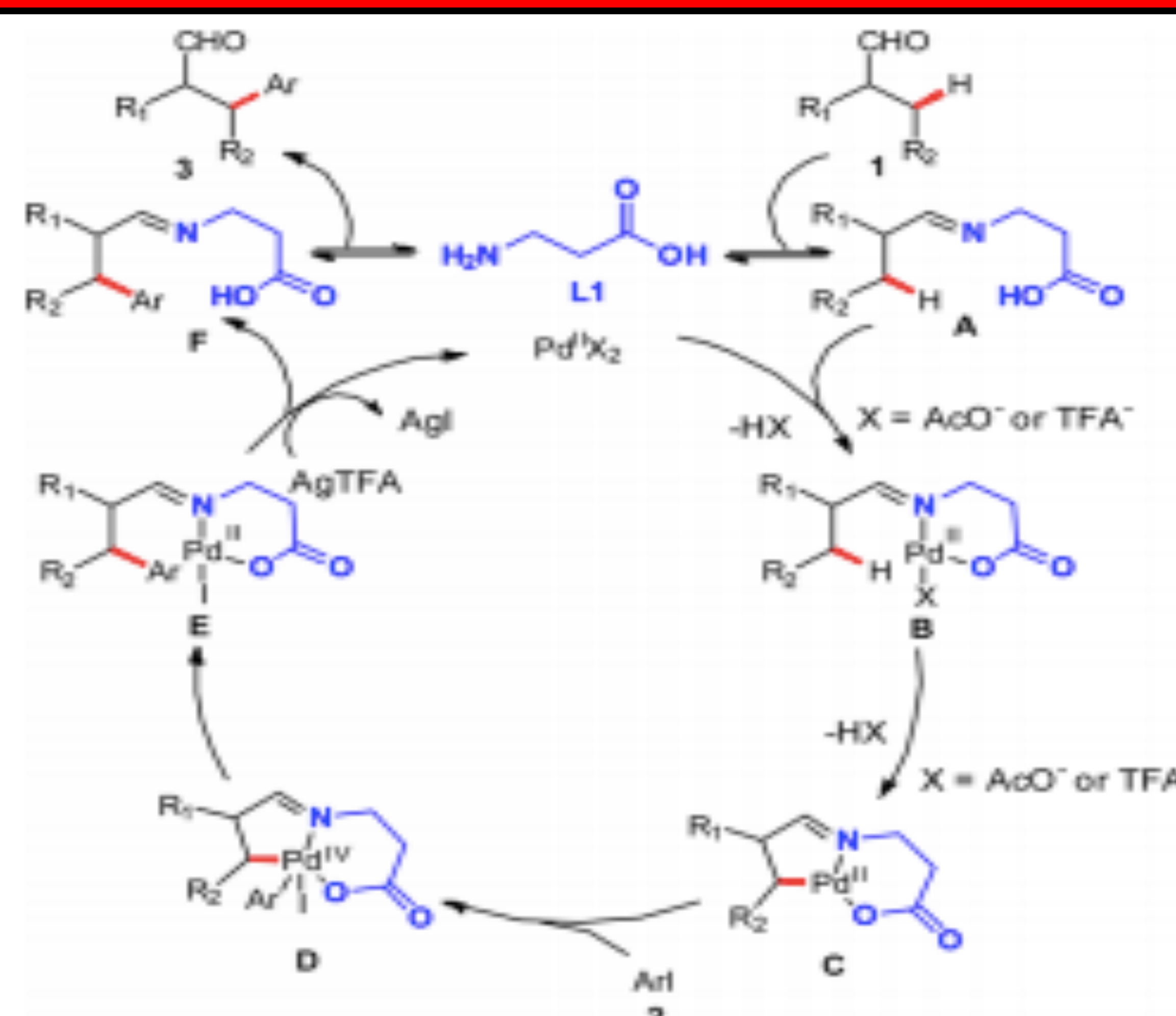


Figure 1. A) Fluorescence images of 6a and 6b in toluene (1.0 × 10⁻⁵ M) under UV light (365 nm). B) The fluorescent images of 6a and 6b before and after grinding.

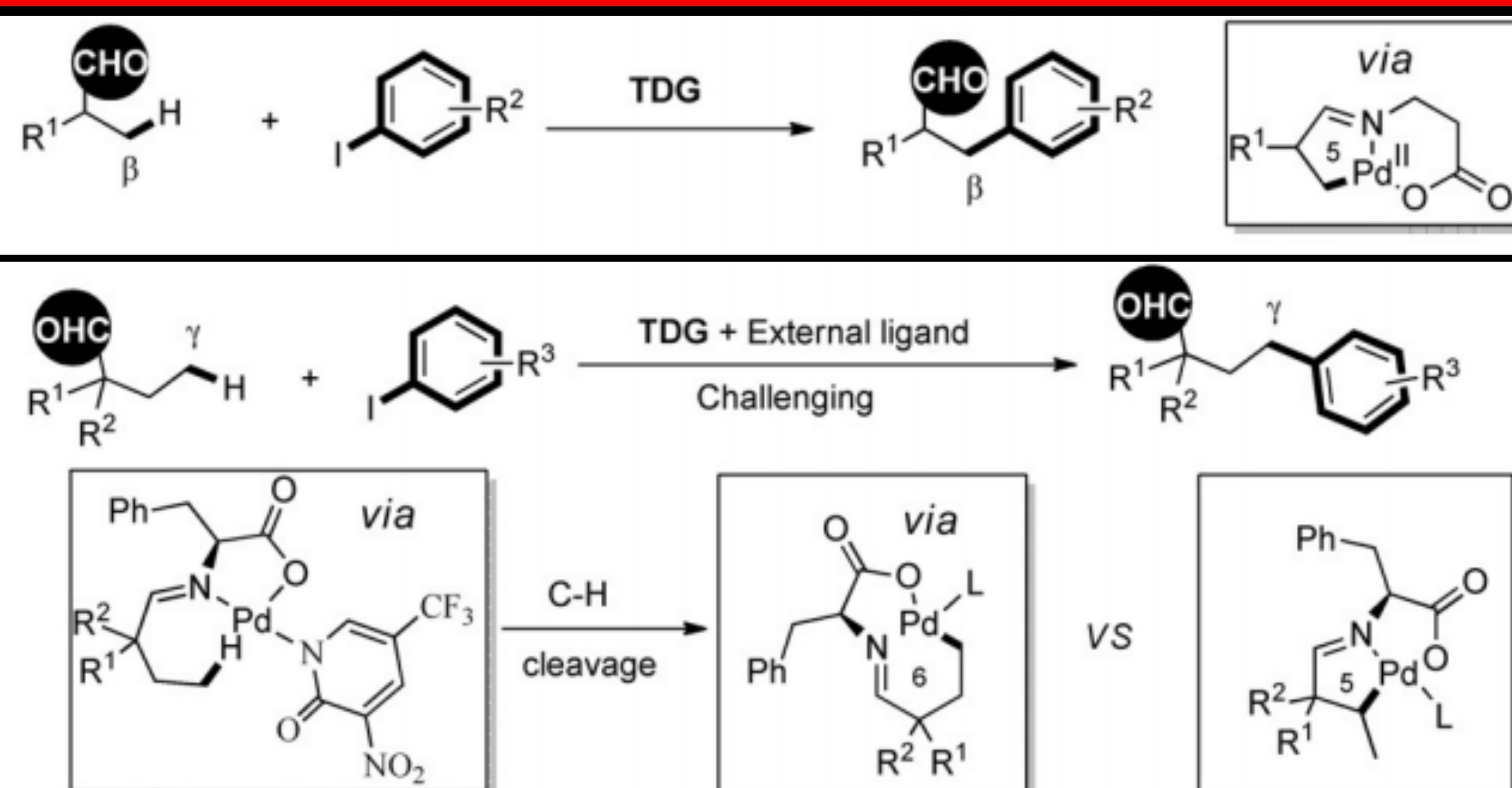
β-Arylation of aliphatic aldehydes



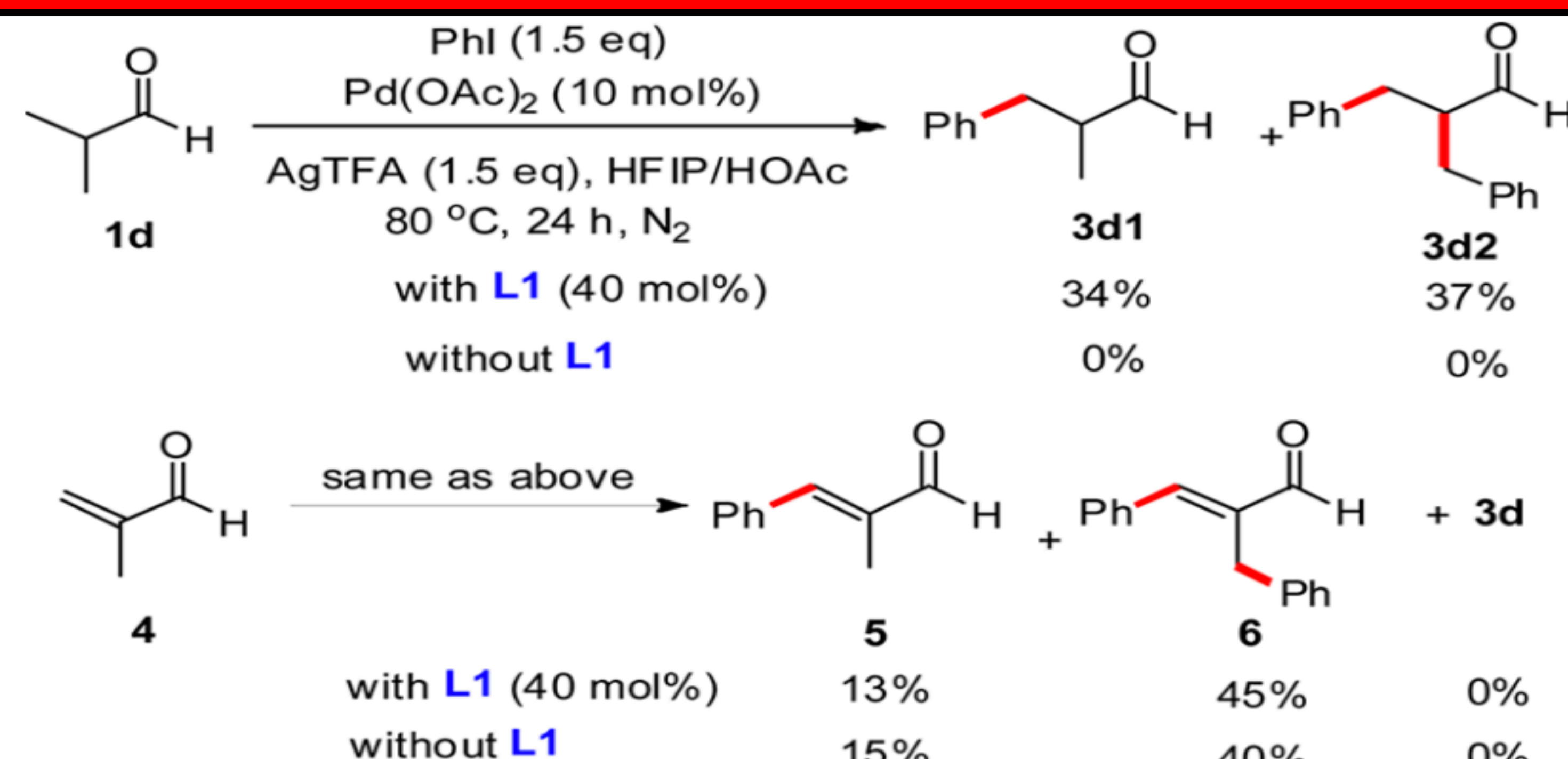
Proposed catalytic cycle



γ-Arylation of aliphatic aldehydes



Control experiments



Conclusion and References

Selective arylation of aliphatic aldehydes was developed via a novel transient ligand-enabled palladium catalyzed C—H bond functionalization. The site-selectivity of this method could be controlled through the selection of the transient ligand. The use of 3-aminopropanoic acid enables β-functionalization, whereas the use of L-phenylalanine promotes γ-functionalization.

- 1) *J. Am. Chem. Soc.* **2016**, *138*, 12775–12778.
- 2) *Angew. Chem. Int. Ed.* **2020**, *59*, 3078–3082

