PALLADIUM-CATALYZED TANDEM ISOMERIZATION/HYDROTHIOLATION OF ALLYL ARENES

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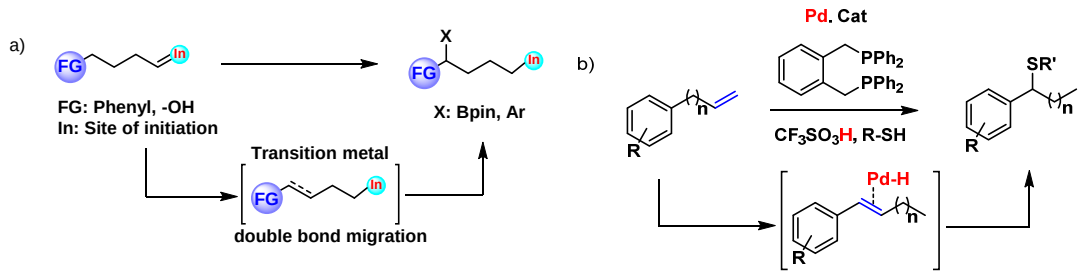
A non-classical transformation that involves initiation of a reaction sequence at a relatively unreactive site, and its termination at a more reactive site in the compound is termed as 'remote functionalization' (Scheme.1a).[1] The use of late transitional metals in such reactions has been pivotal owing to their ability to engage in $1e^-/2e^-$ redox processes. The ability of transition metals such as palladium or nickel to catalyze transformations involving isomerization of double bonds also stems from the inherent structural and electronic aspects of the substrate, such as presence of phenyl group as a thermodynamic sink.[2]



Scheme 1. **(a)** Remote functionalization.
(b) C-S bond formation through tandem Isomerization -hydrothiolation.

In line with the concept of 'remote functionalization', the aim of this doctoral study is the development of novel palladium and nickel-catalyzed tandem reactions. The intended outcome are atom economic and catalytic processes driven by mechanistic understanding. In the direction of our ongoing efforts in C-S bond formation, we endeavored to develop a tandem transformation that furnishes benzylic thio-ethers (Scheme. 1b).[3] The tandem isomerization and hydrothiolation of allyl arenes was developed through use of an *in-situ* generated palladium hydride species and a bisphopsphine ligand. We could extrapolate the catalytic system to encompass longer chain alkenes in our transformation. The conducted mechanistic experiments including deuteration studies and reaction kinetics provided information on the nature of intermediates in the catalytic cycle.

Since remote functionalization enables the rapid assembly of molecular complexity in a single pot, the later stages of the Ph.D shall focus on the development of such transformations using non-precious metal catalysts.

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[1] A. Vasseur, J. Bruffaerts, I. Marek, *Nature Chemistry* 2016, *8*, 209.

[2] a) M. L. Scheuermann, E. J. Johnson, P. J. Chirik, *Org. Lett.* 2015, *17*, 2716-2719. b) A. Kapat, T. Sperger, S. Guven, F. Schoenebeck. *Science.* 2019, *363* (6425), 391-396

[3] P. M. Kathe, I. Fleischer, *Org. Lett.* 2019. 10.1021/acs.orglett.9b00504