

# MECHANISTIC STUDIES ON THE ELECTROCHEMICAL FUNCTIONALIZATION OF ALKENES ENABLED BY (INTER)CHALCOGEN-CATALYSIS

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Alkenes are a readily available structural motif in organic scaffolds and therefore a common starting point for further functionalizations. Research has been mainly focused on transformations utilizing transition metal catalyst in e.g., allylic functionalizations.[1] Although tremendous progress has been made over the past decades, these protocols sometimes face selectivity issues concerning di-, tri-, and tetrasubstituted olefinic substrates. Catalysts based on p-block elements, such as iodine, sulfur, and selenium have been investigated as complementary approach in such transformations and these were successfully utilized in multisubstituted internal alkenes. For example, selenium catalysts have been introduced to catalyze a multitude of oxidative reactions, including the allylic functionalization. These reactions, however, necessitate the use of strong oxidants such as *N*-haloamides and -imides, hypervalent iodine compounds or peroxides, which leads to poor redox and atom economy and sometimes chemoselectivity.[2,3] Electrochemistry circumvents this, as reactive species can be generated at mild conditions with a fine tuneable oxidation potential.

Herein, we report an electrochemical protocol utilizing organic diselenides for the anodic allylic functionalization of alkenes. The mechanism of this reaction with and without disulfides as co-catalysts is elucidated and a variety of transformations for internal *N*-based nucleophiles are presented.[4]

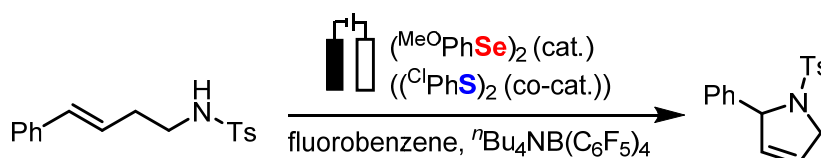


Figure 1. Electrochemical intramolecular amination reaction catalyzed by a diselenide for which the mechanism, with and without a disulfide, was investigated.

[1] I. I. Moiseev, M. N. Vargaftik, *Coordination Chemistry Reviews* **2004**, 248, 2381-2391.

[2] F. V. Singh, T. Wirth, *Org. Lett.* **2011**, 13, 6504–6507.

[3] R. Guo, L. Liao, X. Zhao, *Molecules* **2017**, 22, E835.

[4] M. Wilken, S. Ortgies, A. Breder, I. Siewert, *ACS Catal.* **2018**, 8, 10901–10912 and unpublished results.