

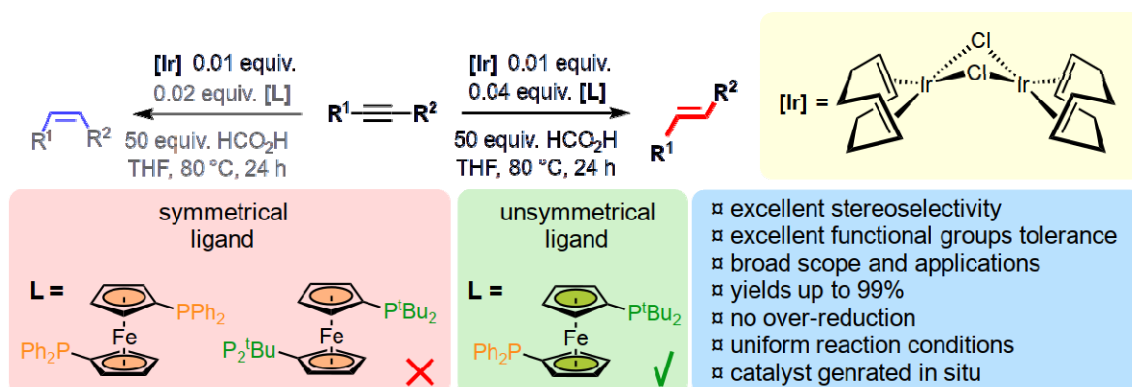
PLAYING WITH C–C MULTIPLE BONDS: FROM OLEFIN METATHESIS TO ALKENE AND ALKYNE HYDROGENATION

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Olefins are ubiquitous organic compounds which contain unsaturated double C–C bonds, and they may be found in many natural products and pharmaceuticals. At the same time alkenes isomerism plays a vital role in the biological activity of drugs, to give one example. Thus, selective methods of their synthesis are highly coveted.

Herein, a short overview of research on catalytic olefin metathesis, a serendipitous discovery of a tandem metathesis-hydrogenation process, [1] and on some new conditions for alkyne (*E*)- or (*Z*)-semihydrogenation will be provided. [2,3] Interestingly, in recently discovered reaction with Ir stereoselectivity may be controlled by metal-to-ligand ratio. [4] The (*E*)-selective variant is distinguished by excellent stereo- and chemoselectivity. Reducible and problematic functionalities are tolerated under reductive conditions, and this makes our methodology a perfect tool for the late-stage functionalization of organic compounds. The environmentally friendly character of this catalytic system is proven by its efficiency and chemoselectivity, which allow one to avoid the use of protecting groups and allow the application of formic acid as a green and safe hydrogen donor. [4]



- [1] Zieliński, G. K.; Majtczak, J.; Gutowski, M.; Grela, K. "A Selective and Functional Group-Tolerant Ruthenium-Catalyzed Olefin Metathesis/Transfer Hydrogenation Tandem Sequence Using Formic Acid as Hydrogen Source" *J. Org. Chem.* **2018**, *83*, 2542-2553.
- [2] Kusy, R.; Grela, K. "*E*- and *Z*-Selective Transfer Semihydrogenation of Alkynes Catalyzed by Standard Ruthenium Olefin Metathesis Catalysts" *Org. Lett.* **2016**, *18*, 6196-6199.
- [3] Kusy, R.; Grela, K. "Ligand-free (*Z*)-selective transfer semihydrogenation of alkynes catalyzed by in situ generated oxidizable copper nanoparticles" *Green Chem.* **2021**, *23*, 5494-5502.
- [4] Kusy, R.; Lindner, M.; Wagner, J.; Grela, K. "Ligand-to-metal ratio controls stereoselectivity: Highly functional-group tolerant, iridium-based, (*E*)-selective alkyne transfer semihydrogenation" *Chem Catalysis* **2022**, *2*, 1346-1361.