

When Palladium-Hydride Catalysis Meets Electrooxidation: Enabling Hydrofunctionalization of Alkenes with Nucleophiles

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Alkenes and other unsaturated compounds are highly valued as starting materials in modern organic synthesis due to their abundance, ready availability, and exceptional synthetic versatility. Among the transformations of unsaturated compounds, hydrofunctionalization—defined as the addition of a hydrogen atom and a functional group across a carbon-carbon double bond—stands out as one of the most efficient methods for constructing complex molecules from simple olefinic precursors. Consequently, a wide range of strategies has been developed to achieve this transformation. Among these approaches, metal-hydride-catalyzed alkene hydrofunctionalization has garnered particular attention, as the desired reactions can be finely tuned through the judicious selection of catalyst and ligand systems. However, despite significant advancements, most existing protocols rely heavily on electrophilic coupling partners that require pre-functionalization, limiting their overall efficiency and applicability.

In this talk, I will present our group's efforts to establish an electrocatalytic platform that merges palladium-hydride catalysis with electrooxidation for the hydrofunctionalization of alkenes using nucleophiles. First, I will introduce the development of an electrooxidative palladium-hydride catalysis for the hydrofluorination of styrenes and α,β -unsaturated carbonyl compounds with nucleophilic fluorine sources.¹ Second, I will discuss the development of an electrooxidative palladium-catalyzed strategy for remote hydrofunctionalization of alkenes with a variety of nucleophiles.² Finally, I will highlight our progress in developing a remote Ritter-type alkene hydroamidation protocol and extending its application to remote hydrotetrazolation.³

References

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