



Multidentate Di-N-Heterocyclic Carbene Ligands for Transition Metal  
Catalyzed Hydrogenation Reactions  
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Synthetic catalysts play an important role in creating a more sustainable society. The use of catalysts has environmental as well as economic advantages. They speed up reactions without being consumed in the reaction itself. Moreover, they reduce the amount of byproducts and waste significantly. Catalysts are applied in various chemical processes, ranging from the manufacturing of products for daily use to the reduction of poisonous sideproducts. In order to warrant an environmentally viable chemical industry, a lot of research on catalysis is being and has been conducted in this field. This research is part of this endeavor. It relies on organometallic chemistry as an essential input for the design of suitable catalysts for homogeneous catalysis.

Homogeneous catalysts often exist as complexes consisting of a metal center surrounded by organic molecules, the ligands. The research described in this thesis aimed to develop new late-transition metal catalysts based on multidentate *N*-heterocyclic carbene (NHC) ligands, especially 1,2,3-triazolyliidenes (tzNHCs). The work demonstrates that (bidentate) tzNHCs are new assets in homogeneous catalysis. They can be efficiently synthesized and coordinated to several late-transition metals. The applications of the developed electron-rich complexes are illustrated by various catalytic hydrogenations, including enantioselective transformations and the hydrogenolysis of challenging ester substrates. Because of the convenient synthetic route and the endless possibilities to vary tzNHC ligands, it is plausible that these ligands will facilitate interesting new applications in the future.