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学 位 論 文 内 容 の 要 旨

Abstract of Doctoral Dissertation

博士の専攻分野の名称　博士（生命科学）　氏　名　Iman Abdullah

Degree requested　Doctor of Life Science　Applicant name

学 位 論 文 題 名

Title of Doctoral Dissertation

Studies on Nickel-Mediated and -Catalyzed Hydrocarboxylation of Ynamides with Carbon Dioxide

（ニッケル錯体を用いた量論的および触媒的なイナミドのヒドロカルボキシル化反応に関する研究）

Ni-mediated or -catalyzed fixation of CO_2 into unsaturated C-C bond is a promising method for one-carbon elongation reactions due to the inexpensiveness and abundance of CO_2. Carboxylation of various unsaturated compounds such as alkynes, alkenes, allenes, and dienes are well known to proceed in the presence of nickel complex. Although carboxylations of alkynes have been studied extensively, the scopes were limited to relatively simple terminal- or internal alkynes. The reactivity of the electronically biased alkynes such as ynamides has been remained elusive. Herein, I report Ni(0)-mediated and -catalyzed hydrocarboxylation of ynamides by employing CO_2 as a carbon source.

Hydrocarboxylation of ynamides in the presence of a stoichiometric amount of $Ni(cod)_2$ and DBU ligand in THF afforded β-aminoacrylate as a sole product**.** The reaction proceeded via oxidative cycloaddition of CO_2 and ynamide on Ni(0) to form a nickelalactone intermediate in a regioselective manner. This method provides an easy access to the synthesis of unnatural optically active β-aminoacid derivatives after subsequent Rh-catalyzed asymmetric hydrogenation.

Then, catalytic protocol for regioselective hydrocarboxylation of ynamides was developed by use of $Ni(cod)_2$/bpy as catalyst, magnesium bromide/zinc as additive/reducing agent and water as proton source. Interestingly, the selectivity of CO_2 incorporation was in contrast to that of the stoichiometric carboxylation. While hydrocarboxylation in the stoichiometric condition gave β-carboxylated as a sole product, the catalytic protocol mainly afforded an α-carboxylated product as a major product. Control experiments clarified the key factor for α-selectivity is a combination of zinc and magnesium bromide. The procedure is applicable to ynamides having various alkyl-substituents and substituted aromatic ring on β-carbon, as well as some electron withdrawing groups (EWG) on a nitrogen atom of ynamide.