Transition Metal Catalysed C-H Functionalization of Ferrocene Carboxamide using 8-Aminoquinoline as a Removable Directing Group

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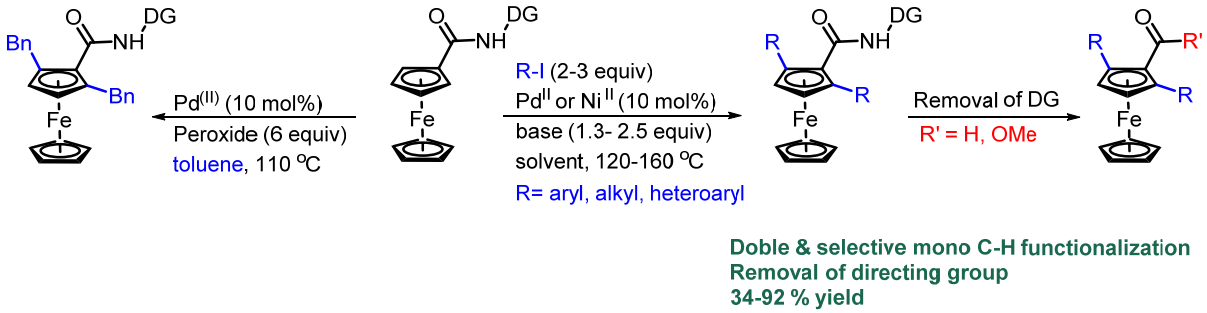
Abstract:
Functionalized ferrocene have attracted considerable interest in catalysis, material science, components of polymers, molecular switches, drugs, sensors and as a chiral ligand.[1] Consequently, there is permanent interest for synthesizing substituted ferrocene motif. Although C-H functionalization of ferrocene has limited reports.[2] A mild and efficient palladium-catalyzed synthetic method for the C-H functionalization of ferrocenecarboxamide has been developed using 8-aminoquinoline as a removable directing group.

Various aryl iodides containing halo, NO_2, CN, COMe, CO_2Et, and NH functionalities and also alkyl iodides successfully underwent the Pd-catalyzed intermolecular C-C bond forming reaction with ferrocenecarboxamide, which led to a diverse array of bis(aryl/alkyl) ferrocenecarboxamides in 34–92% yields. Selective monoalkylation of ferrocenecarboxamides were studied using bicarbonate as a base and phosphoric acid as an additive under Pd-catalyzed reaction conditions.[3] Furthermore, toluene has also been coupled with ferrocenecarboxamide in the presence of Pd-catalyst and peroxide. Finally, removal of the directing group, from bis(aryl)ferrocenecarboxamides led to bis(aryl)ferrocenes bearing versatile methyl ester and carboxaldehyde functional groups.[4]



Scheme: C-H functionalization of ferrocene and removal of directing group

References and Notes:

1. Togni, A.; Hayashi, T. *Ferrocenes: Homogeneous Catalysis, Organic Synthesis, Materials Science*, Wiley VCH, Weinheim, 1995.
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4. *Manuscript under prepration.*