

## ABSTRACT

The formation of carbon-carbon (C-C) and carbon-nitrogen (C-N) bonds is discussed and efforts towards expanding the known reactions of this type are the primary focus of this work. The iron-catalyzed arylation of aromatic heterocycles, such as pyridines, thiophenes and furans has been achieved. The use of an imine directing group allowed for the *ortho*-functionalization of these heterocycles with complete conversion in 15 minutes at 0 °C. Yields up to 88% were observed in the synthesis of 15 heterocyclic biaryls. C-N bond formation is achieved using aryl Grignard reagents and N-chloroamines at -78 °C.