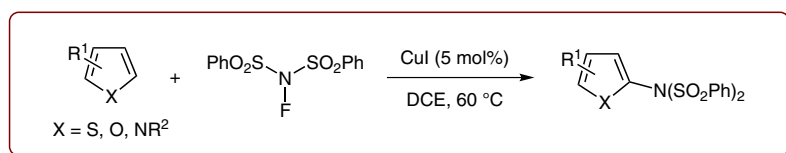
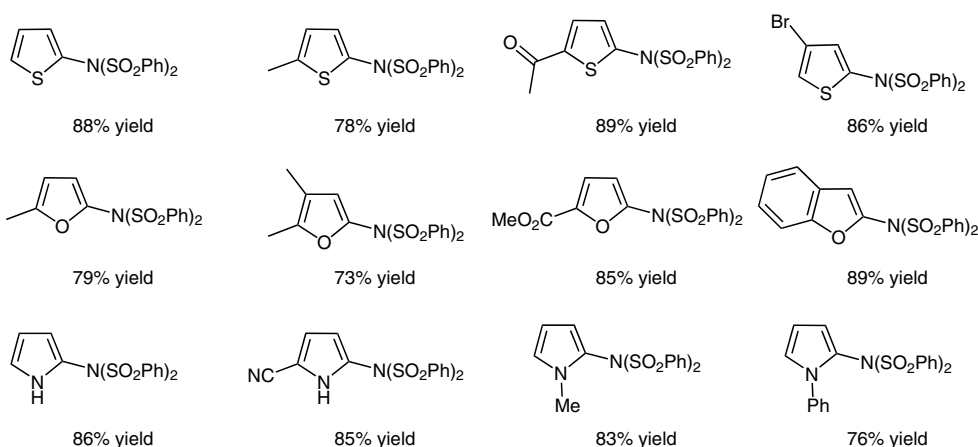


# Copper-Catalyzed Amidation of $\pi$ -Excessive Heterocycles



## Representative examples:



**Significance:** Amino-substituted heterocycles are prevalent as subunits in a large number of pharmaceutical drug targets. As a result, transition-metal-catalyzed aryl C–N bond formation has been studied extensively. Traditionally, these compounds are synthesized by coupling heteroaryl halides with amine surrogates. Pan and co-workers report an efficient method for direct amidation of  $\pi$ -electron-rich heterocycles with *N*-fluorobenzenesulfonimide (NFSI). Interestingly, even though NFSI is typically used as a fluorinating reagent, no fluorinated byproducts are observed in this reaction. The procedure uses mild conditions to provide the desired functionalized products in high yields.

**Comment:** A variety of electron-deficient and electron-rich thiophenes, furans, and pyrroles undergo regioselective amidation under these reaction conditions. Although the reaction does proceed at ambient temperature, higher yields are obtained at slightly elevated temperature (60 °C). A mechanistic pathway involving copper(I), copper(II), and copper(III) species is proposed, and further studies to investigate the mechanism of this transformation are underway. For a recent method of 2-aminothiophene and other  $\pi$ -excessive heterocycle synthesis, see the copper(II)-catalyzed synthesis of 2-aminothiophenes from alkynoates and thioamides (*Org. Biomol. Chem.* **2014**, *12*, 8473; *Synfacts* **2015**, *11*, 24).