Copper-catalyzed Three-component Carboamination of Alkenes

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The carboamination of alkenes entails the addition of carbon and nitrogen across a carbon–carbon double bond and represents a powerful means of assembling nitrogen-containing molecules from simple building blocks. To date, most alkene carboamination reactions have exploited one- or two- component strategies to control chemo- and regio- selectivity, and are significantly limited in their modularities. Herein, we report the discovery of a copper-catalyzed method that enables fully intermolecular alkene carboamination. Electron rich, electron poor, and internal styrenes, as well as α-olefins are readily functionalized with a range of α-halocarbonyls and amines. This reaction provides single-step access to valuable γ-aminocarbonyl compounds and γ-lactams, structural motifs that appear in a wide variety of synthetic intermediates, and biologically active molecules.

Our preliminary mechanistic investigations suggest that the reaction is proceeding through the addition of a carbon-centered radical to an olefin followed by oxidation to form a 5-membered oxocarbenium intermediate and subsequent nucleophilic ring opening to forge the C–N bond. We attribute the unprecedented scope of this carboamination reaction to the intermediacy of this key intermediate. Future and current work will focus on leveraging this system as a general platform for the carbofunctionalization of alkenes.