

Cu(I)-catalyzed exclusive 6-*endo-dig* cyclization towards functionalized 1-naphthylamines

With the support by the National Natural Science Foundation of China, the research team led by Prof. Zhou YongBo (周永波) and Dr. Dong JianYu at the State Key Laboratory of Chemo/Biosensing and Chemometrics, College of Chemistry and Chemical Engineering, Hunan University, cooperated with the research team led by Prof. Yuan Lin from Hunan University, and recently reported a convenient, efficient, and direct approach toward 1-naphthylamine frameworks via Cu(I)-catalyzed 6-*endo-dig* cyclization of readily available terminal alkynes, 2-bromoaryl ketones, and amides. This intriguing result was published in *J Am Chem Soc* (2019, 141: 2535–2544).

Functional group substituted 1-naphthylamines, especially *N*-methylated ones, are prevalent in natural products, pharmaceuticals, agrochemicals, functional materials, and dyestuffs, as well as in many synthetic reagents and catalysts. However, these compounds' general and step-economic syntheses are highly limited, which seriously restricts efforts to improve the properties and develop new functions for this kind of compound.

As a result of continuous interest in the selective transformation of alkynes, the research team has developed an efficient, convenient, and general method for the synthesis of valuable functionalized 1-naphthylamines directly from readily available terminal alkynes, 2-bromoaryl ketones, and amides via Cu(I)-catalyzed benzannulation in a green solvent (i. e. , water) under Pd- and ligand-free conditions. A total of 82 functionalized 1-naphthylamines, especially synthetically and biologically useful *N*-methylated compounds, are synthesized in isolated yields up to 95%. Some unique features of the reaction are as follows: (1) exclusive 6-*endo-dig* selectivity, (2) ready incorporation of a broad range of functional groups directly from easily available substrates, and (3) amides that can be used as aminating agents and that are excellent alternatives to toxic and/or odorous amines. Due to facile tuning of functional groups for the reaction, the products possess good electronic donor-acceptor structures and exhibit intriguing photophysical properties, such as tunable and polarity-sensitive fluorescence emission and large Stokes shifts (up to 258 nm). Utilizing the products' unique polarity-sensitive fluorescence response, applications in imaging lipid droplets (LDs) and monitoring cellular LDs growth have been successfully achieved.

This work represents an ideal strategy for the synthesis of 1-naphthylamines, and may be highly useful in chemistry, biology, and materials science.

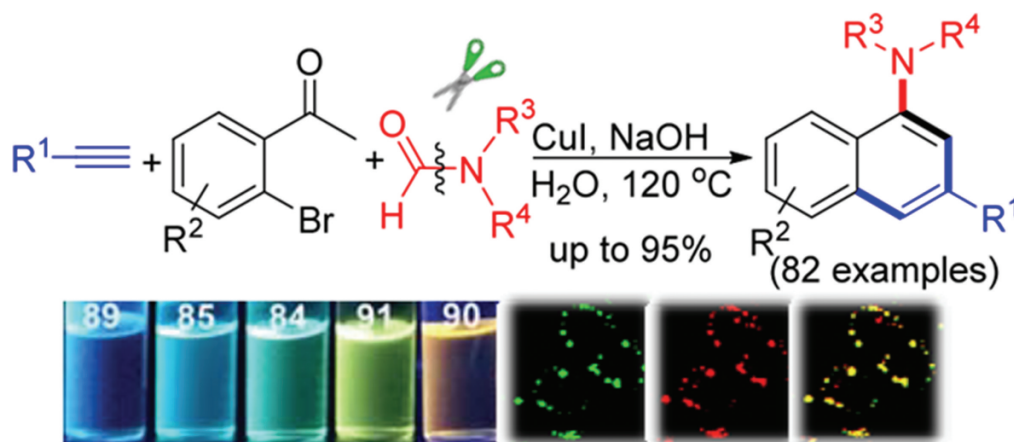


Figure Cu(I)-catalyzed exclusive 6-*endo-dig* cyclization toward 1-naphthylamines.