Electrophilic Indole and Pyrrole Reagents for C-H Functionalization

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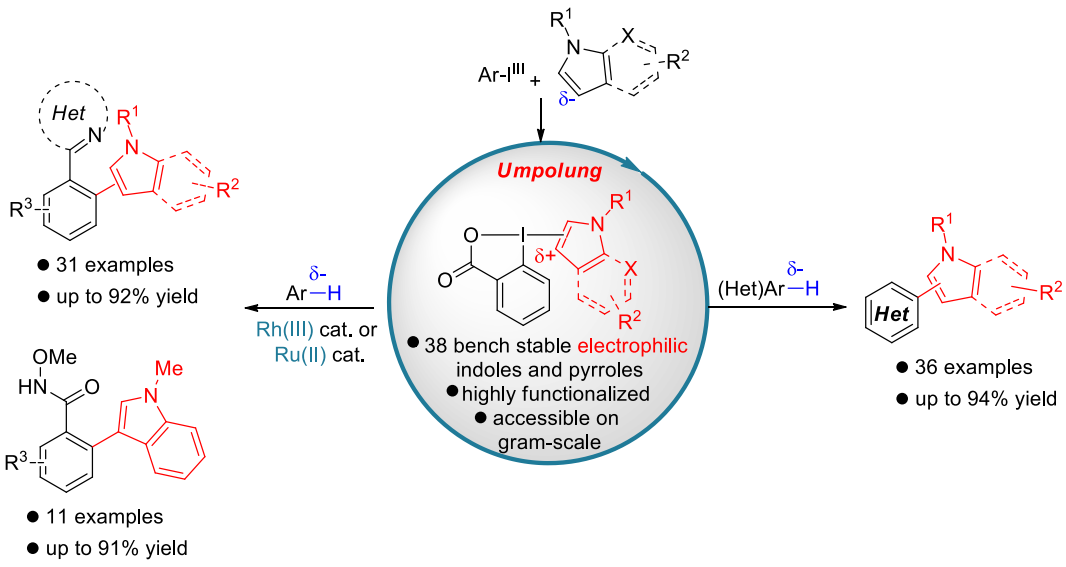
Amongst all the azoles present in nature, electron-rich pyrroles and indoles are the most ubiquitous.[1] In particular, the subclass of mixed bi-(hetero)arenes is encountered in top selling drugs,[2] optoelectronic materials and natural bioactive compounds.[3] Even if many methods for the formation of the (hetero)arene-indole or -pyrrole bond have been reported,[4] low regioselectivity, homo-coupling, de-aromatization and polymerization are common limitations. To overcome the intrinsic nucleophilic properties of electron-rich indoles and pyrroles, a "umpolung" approach can be considered to allow new synthetic disconnections. Hypervalent iodine reagents are known to invert the reactivity of various nucleophiles,[5] but have been only rarely used in the case of electron-rich heteroarenes. In fact, from the '70s, a few groups[6] reported the synthesis of unstable hypervalent indoles iodonium salts -their synthesis involving a self-detonating betaine intermediate-[7] with a limited number of applications.[8] We present herein the synthesis of 38 novel electrophilic indole and pyrrole benziodoxolone reagents.[9] These new reagents are bench stable, highly functionalizable and their synthesis is facile and scalable. They can be applied in metal-catalyzed C-H activation transformations as well as metal-free oxidative cross couplings with electron-rich (hetero)arenes.[10] In both methods the desired products were obtained with high regioselectivity and could not be synthesized using previously reported metal catalyzed C-H arylation processes.



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