



Boron-Relayed Strategies for C-C Bond Formation

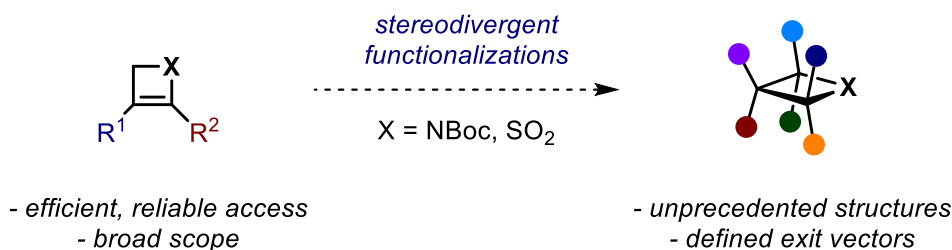
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Part 1 – Access to new building blocks

Many bioactive compounds contain aromatic moieties. Current trends in medicinal chemistry aim at substituting these flat motifs with 3D-architectures and give more perspective to the molecules in order to tune structure-activity relationships. While propellanes and cubanes have recently received growing interest from the community of synthetic and medicinal chemists, diverse and efficient stereoselective functionalization of strained heterocycles remains scarce. With the right set of tools in hands, one could gain control over the spatial arrangement of different substituents around these structures, and develop stereodivergent strategies towards sophisticated azetidines, cyclobutanes and thietanes.

Since 2015, we have established dependable routes to access unsaturated four-membered carbo- and heterocycles, using simple methods based on organometallic and organoboron chemistry.^[1-6] With a strained endocyclic double bond, those compounds represent an ideal platform for the formation of elaborated saturated structures through different transformations.



In this communication, we will present divergent one-pot sequences for the functionalization of 4-membered rings,^[7-12] as these could potentially be used as analogs of pyridines, pyrrols or thiophenes, balancing both rigidity and flexibility.

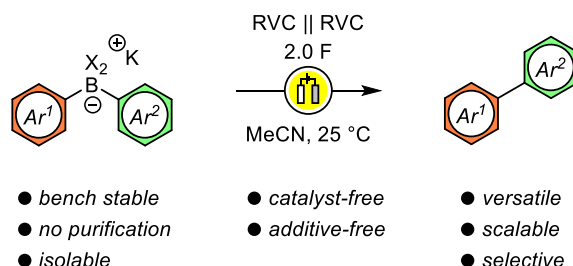
Part 2 – Electrocoupling

Our efforts toward sustainable C-C bond formation have led us to investigate alternative catalyst-free coupling reactions. Having previously demonstrated that organoboron reagents can serve as templates in Zweifel olefinations,^[13] we set out to develop a conceptual approach for hetero-coupling reactions.

As many methods for the formation of hetero-biaryls require expensive and/or environmentally challenging transition-metal catalysts as well as inert and dry conditions, we envisioned that bench-



stable, hetero-substituted arylborate salts could undergo formation of (hetero)biaryls, triggering the key 1,2-metallate rearrangement step under electrochemical oxidation.^[14-16]



First, a novel and practically simple access to tetraarylborates will be described, providing a new library of heterosubstituted structures.

Second, the chemoselectivity of the electrocoupling reaction will be discussed, as well as its current applicability and limitations.^[17-19]

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