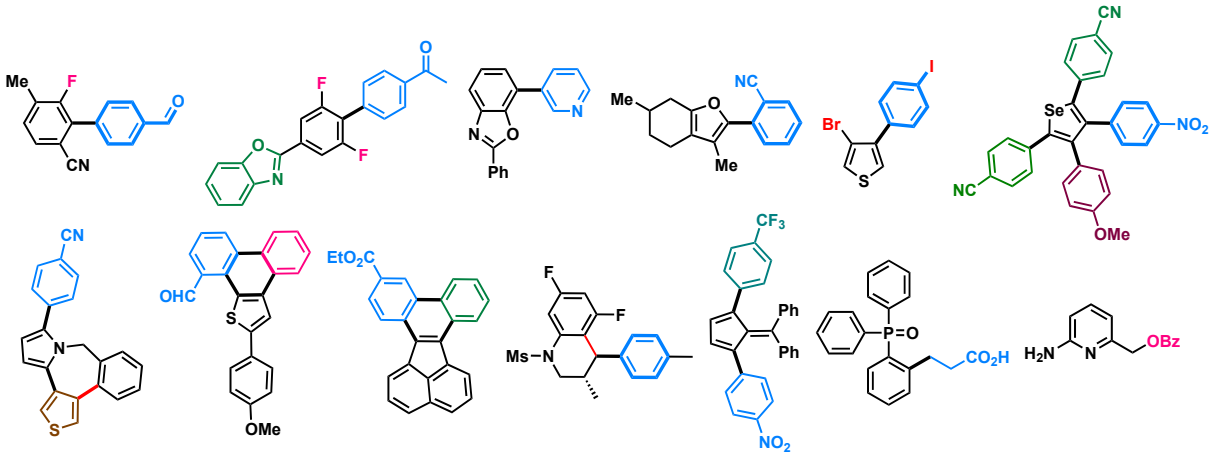
Transition Metal-Catalyzed C–H Bond Functionalization: Application to the Synthesis of Life and Material Molecules

Jean-François Soulé

Univ Rennes, CNRS, ISCR UMR 6226, F-35000 Rennes, France
jean-francois.soule@univ-rennes1.fr, http://blogperso.univ-rennes1.fr/jean-francois.soule/

Transition-metal-mediated direct coupling *via* C-H bond cleavage is currently one of the most active areas in organic synthesis. We found that appropriately (hetero)aromatic substrates such as (poly)fluorobenzene, thiophenes, selenophenes, pyrroles, and benzoxazoles can undergo palladium catalyzed direct coupling with benzenesulfonyl chlorides and/or aryl bromides *via* regioselective C-H bond cleavage allowing the straightforward preparation of pharmaceutical motifs[1] and organic materials precursors.[2] We have developed methods that can target multiple different C–H bonds on heterocycles using catalyst and/ or reagent control to define simultaneously how each site is regioselectively modified based on electronic factor rather than employ a directing group.[3] Such procedures have been extent to iterative process for the synthesis of polycyclic organic molecules.[4] We also apply C–H bond functionalization in the late stage modifications ligands for the preparation of new catalytic systems.[5]



1. a) F. Abdellaoui, C. Youssef, H. Ben Ammar, T. Roisnel, J.-F. Soulé, H. Doucet, *ACS Catal.* **2016**, *6*, 4248; b) T. Yan, L. Zhao, M. He, J.-F. Soulé, C. Bruneau, H. Doucet, *Adv. Synth. Catal.* **2014**, *356*, 1586; c)

2. a) I. Idris, F. Derridj, J.-F. Soulé, H. Doucet, *Adv. Synth. Catal.* **2017**, *359*, 2448 ; b) A. Skhiri, R. B. Salem, J.-F. Soulé, H. Doucet, *Chem. Eur. J.* **2017**, *23*, 2788; c) I. Idris, T. Tannoux, F. Derridj, V. Dorcet, J. Boixel, V. Guerchais, J.-F. Soulé, H. Doucet, J. Mater. Chem. C 2018, Advance Article.

3. a) K. Yuan, J.-F. Soulé, H. Doucet, ACS Catal. 2015, 5, 978 ; b) R. Jin, K. Yuan, E. Chatelain, J.-F. Soulé, H. Doucet, *Adv. Synth. Catal.* **2014**, *356*, 3831, c) A. Hfaiedh, K. Yuan, H. Ben Ammar, B. Ben Hassine, J.-F. Soulé, H. Doucet, *ChemSusChem* **2015**, *8*, 1794; d) A. Skhiri, A. Beladhria, K. Yuan, J.-F. Soulé, R. Ben Salem, H. Doucet, *Eur. J. Org. Chem.* **2015**, 4428.

4. a) K. Yuan, J.-F. Soulé, V. Dorcet, H. Doucet, *ACS Catal.* **2016**, 8121b) W. Hagui, N. Besbes, E. Srasra, T. Roisnel, J.-F. Soulé, H. Doucet, *Org. Lett.* **2016**, *18*, 4182; c) W. Hagui, K. Yuan, N. Besbes, E. Srasra, J.-F. Soulé, H. Doucet, *chemCatChem* **2015**, *7*, 3544 d) X. Shi, T. Roisnel, J.-F. Soule, H. Doucet, *Org. Chem. Front.* **2018**, 5, 398.

5. a) M. Brahim, H. Ben Ammar, V. Dorcet, J.-F. Soulé, H. Doucet, *Org. Lett.* **2017**, *19*, 2584; b) C.-S. Wang, T. Roisnel, P. H. Dixneuf, J.-F. Soulé, *Org. Lett.* **2017**, *19*, 6720; c) C.-S. Wang, P. H. Dixneuf, J.-F. Soulé, *ChemCatChem* **2017**, *9*, 3117