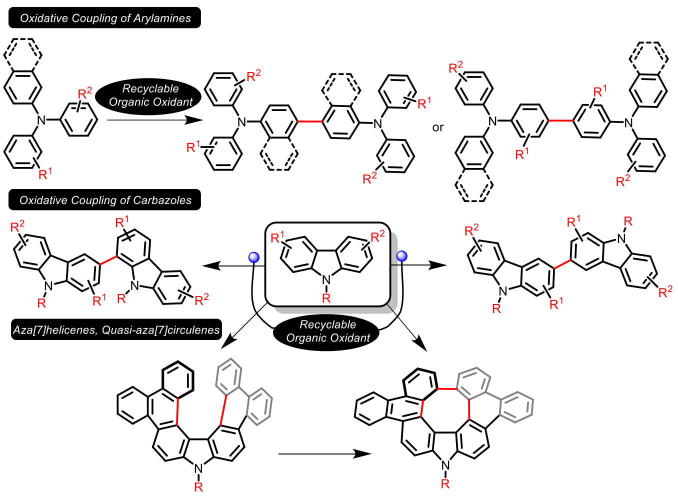
PhD Seminar II

Oxidative Coupling of Arylamines and Carbazoles Using Quinone-based Organic Oxidants

Name: Sudesh Mallick (CY15D013) Date: 7 April 2021
Venue: zoom link Time: 3:30 pm

Tetraarylbenzidines (TABs) and tetraarylnaphthidines (TANs) are potential hole-transporting materials in organic electronics.[1] They are often synthesized by transition-metal catalysed cross-coupling reactions.[2] While a few reports demonstrate a metal-based oxidative coupling method,[3a-e] there are only scant reports that employ metal-free organic oxidants to achieve TABs and TANs.[3f-g] The present work describes the method of preparation of TABs and TANs by exploiting a metal-free, halogen-free, and recyclable quinone-based reagents, viz., chloranil/H^+ or DDQ/H^+, as organic oxidants.[4a] Many substituted arylamines with different electronics and sterics have undergone oxidative coupling efficiently to offer TABs and TANs in good to excellent yields. Using this successful approach, several bicarbazoles have also been successfully synthesized from substitutionally-different carbazoles. Interestingly, it is found that the regioselectivity profile of bicarbazole (i.e., 3,3'-bicarbazole vs. 1,3'-bicarbazole) formation is purely governed by the electronics of carbazole.[4b] Generally, bicarbazoles are important skeletons in several natural products and have demonstrated applications in organic light-emitting diodes. To further showcase the benefit of the organic coupling agent, a one-step good-yielding synthesis of aza[7]helicenes[5] and quasi-aza[8]circulenes[5] starting from carbazole has been established. The isolated helicenes/circulenes are characterized by single crystal X-ray structural analysis, optical and electrochemical studies. The research findings on the above topic will be presented.



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