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Oxidative Coupling of Carbazoles as an Unique Approach for Developing Bis-Carbazolic Functional Dyes

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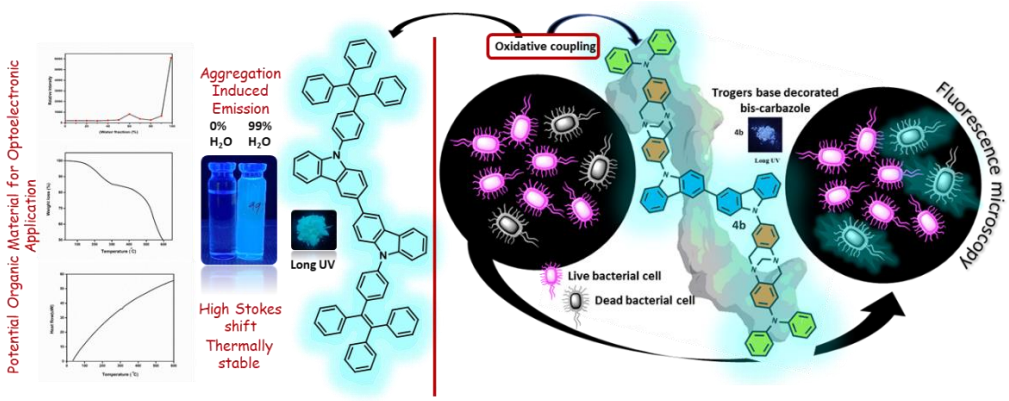
Abstract: Bis-carbazoles (BCz), with two carbazole units linked through the 3-3' positions, belong to a class of molecules with numerous applications in organic electronics, sensors, photovoltaics due to their low ionization potential, high thermal stabilities, as well as their blue luminescence. Bis-carbazole scaffolds have also been utilized as potential host materials for phosphorescent OLEDs. We realized that oxidative coupling strategy of carbazoles to access the bis-carbazole scaffold would be the ideal strategy to rationally design bis-carbazole incorporated functional dyes. The regioselective oxidative coupling has been the key step for combining the two carbazoles which pave the way towards the easy late-stage functionalization of the molecules with different rotatable groups. We envisaged that the bis-TB unit will induce more twists in the molecule thereby affecting their optical properties, especially in the condensed state, by preventing the intermolecular close π–π stacking interactions. Furthermore, incorporation of electron-donating aryl or heteroaryl moieties (naphthalene, di phenylamine, and carbazole) at the two terminals of the molecule via Suzuki or Buchwald coupling will allow maneuvering the band-gaps to promote the easy hole transport phenomenon. Moreover, the introduction of bulky substituents was to ascertain intense solid-state fluorescence due to the hindered intermolecular interactions. Subsequently, we have demonstrated the synthesis of few bis-carbazolic functional molecules which can be used for sensing dead bacterial cell as well can be considered as potential hole transporting materials for optoelectronic applications.[2]



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