Tetracyanobutadiene-based charge-transfer chromophores: investigations with phenanthroline derivatives

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Electron donor-acceptor structures have received a long-standing attention owing to their utility in multiple fields of application, sparkling interest in non-linear optics, photovoltaics or chemical sensing. To allow the tunability of their optoelectronic properties, a versatile approach to their preparation is highly desirable. In this context, tetracyanobutadienes (TCBDs) acceptors are attractive motifs that are conveniently installed by [2+2] cycloaddition-retroelectrocyclization (CA-RE) click reaction.1 Though their chemistry has been intensively explored, including with the recent addition of ynamide-based reactivity suggested by our group,2 their practical use remains limited by ultrafast excited-state dynamics that eventually render this class of chromophores non luminescent in the vast majority of cases.3 In this contribution, we propose to examine unconventional photophysical behaviours of TCBDs attached to a chromophore, more specifically focusing on 1,10-phenanthrolines and their utilization as ligands for metal complexation. This rational study aims at shedding light to their properties to help develop molecular design strategies, with the potential prospect of the implementation of such materials in organic photovoltaic devices.



Figure 1 Synthesis of TCBDs by [2+2] CA-RE Click reaction

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