

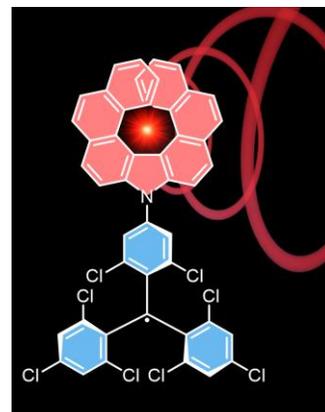
Donor Functionalized Trityl Radicals—Towards Organic Molecular Color Centers

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Triarylmethyl radicals are stable organic open-shell emitters with fluorescence in the orange to deep red spectrum. These light emitting radicals feature doublet ground and excited states, overcoming the spin statistical limitations of conventional closed-shell emitters. Whereas tris(2,4,6-trichlorophenyl) methyl (TTM) radicals exhibit relatively low photoluminescence quantum yields (PLQY) of around 3%, the functionalization of TTM with electron donor moieties can yield molecules with PLQY of up to unity. In OLEDs, such high-performance radicals have reached internal quantum efficiencies (IQEs) of around 100%, rendering these open shell molecules highly interesting as emitters in light emitting organic devices. However, the influence of the donor strength on the emission characteristics of TTM is not well understood, and current synthetic routes limit the variety of employable donors for the functionalization of TTM.



Here, I will present a series of around 30 N-coupled donors and acceptors to the TTM radical and explain why a medium strength donor gives the highest PLQY. Moreover, I will elucidate the limits for tuning of the emission wavelength within the class of these N-donor coupled TTM emitters and present a pathway of producing radicals with chiral donors for circularly polarized emission (CPL). Moreover, I will discuss the potential of light-emitting diradicals for quantum sensing applications. These results will enable new design strategies for stable and high-performance light emitting radicals.

Bio:

April 2002 – July 2005	Chemistry studies at the University of Cologne and University of Strathclyde, Glasgow, UK. (<i>BSc with First Class Honours</i> , 08.07.2005)
Oct. 2005 – Nov. 2008	European PhD: University of Strathclyde, Physical Chemistry of Polymers Group (R. A. Pethrick) and University of Cologne, Polymer Synthesis (B. Tieke). (<i>PhD</i> , University of Strathclyde, 25.09.2008)
Dec. 2008 – July 2010	Postdoc: University of Cologne, Organic Nanoelectronics Group (K. Meerholz)
July 2010 – July 2011	Postdoc: Harvard University, USA, Exp. Soft Cond.Matter Group (D. A. Weitz)
Dec. 2011 – Oct. 2018	research group leader at DWI – Leibniz Institut für Interaktive Materialien e.V. (<i>Habilitation</i> , RWTH Aachen, 14.12.2017)
since Oct. 2018	Institute director and chair of Organic and Macromolecular Chemistry, Ulm University.

