Circularly polarized OLED based on thermally activated delayed fluorescence molecules

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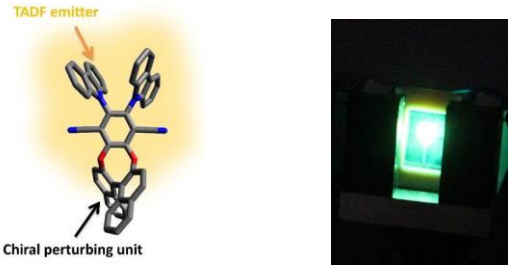
Abstract:
Organic Light-Emitting Diodes (OLEDs) have already entered the mass production market in small size displays (smart phone…) or larger display devices for OLED televisions. However, the request in the market continues to grow for low-power consumption, low-cost and flexible devices. Direct emission of circularly polarized light from OLEDs can improve the contrast ratio of the OLED display (1), increase the efficiency and simplify device architecture (2). Circularly polarized luminescence (CPL) emitters represent an important family of molecules, where efficient and easy syntheses, high quantum yields and dissymmetry factors are key challenges (3). Purely organic CPL emitters are often tedious to synthesize and require chiral purification methods. The development of thermally activated delayed fluorescence (TADF) materials for optoelectronic applications is an active area of recent research (4). TADF emitters are a class of fluorophore that enable harvesting triplet states for fluorescent emission by a reverse intersystem-crossing phenomenon. This allows maximal emission efficiencies, especially in organic electroluminescent devices (OLEDs) that generate 75% triplet exciton.
We have developed a class of purely organic luminophore that combines CPL with TADF in a modular design, and exhibits attractive photophysical properties (5). This presentation will disclose the concept, preparation, and properties of this new class of molecules, and present their application in OLED devices. Structure-properties relationships have also been explored and will be discussed.



Chiral TADF-CPL emitter design (left) ; and OLED prepared with the title compound (right)

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