**Design and Synthesis of CPL-Emissive Helicenes by Controlling Transition Electric and Magnetic Dipole Moments**

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Helicenes have helically twisted MOs and have attracted attention for their chiroptical properties. Circularly polarized luminescence (CPL)-emissive molecular materials with high emission quantum yield () and high dissymmetry factor (*g*lum) are desired.

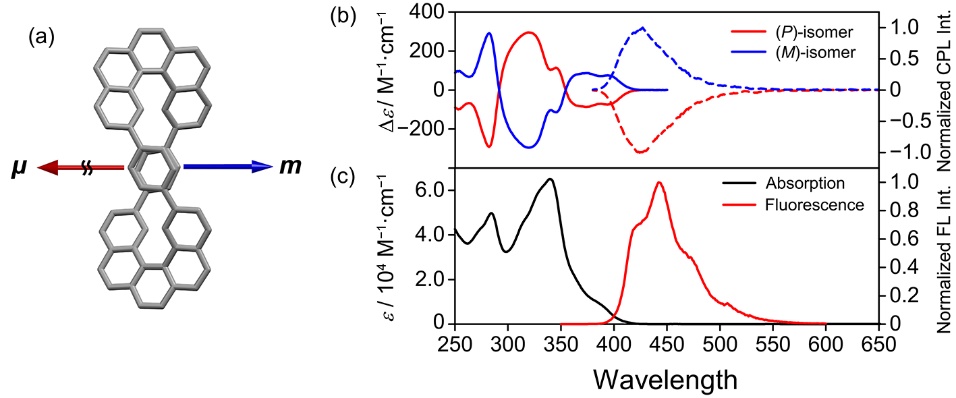
Unsubstituted [5]helicene **1** is non-emissive, however, the fluorescence of [5]helicene derivative **2** is efficiently increased by making the S1→S0 transition symmetry-allowed to exhibit a high fluorescence quantum yield (f = 0.23).1 Synthesis and chiroptical property of [7]helicene derivatives **3**2 and donor-acceptor type [5]helicene derivative **4**3 will also be presented.

Dissymmetry factor (*g*lum) of CPL is determined by the transition electric and magnetic dipole moments, ****** and ***m***, according to the following equation.

 ··· (1)

*D*2 symmetry is the only point group where the direction of ****** and ***m*** are always parallel, so that high *g* value is expected. Figure-eight-shaped [5]helicene dimer **5** was thus designed and synthesized to showed excellent chiroptical properties (f = 0.08, |*g*lum| = 1.5 × 10−2) (Fig. 1).4





**Fig. 1.** (a) The spatial arrangement of ****** and ***m*** of **5**. (b) CD (solid line) and CPL (dashed line) spectra of **5** in chloroform at room temperature. (c) UV–vis absorption (left, black line) and fluorescence spectra (right, red line) of **5** in chloroform.

**References**

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