

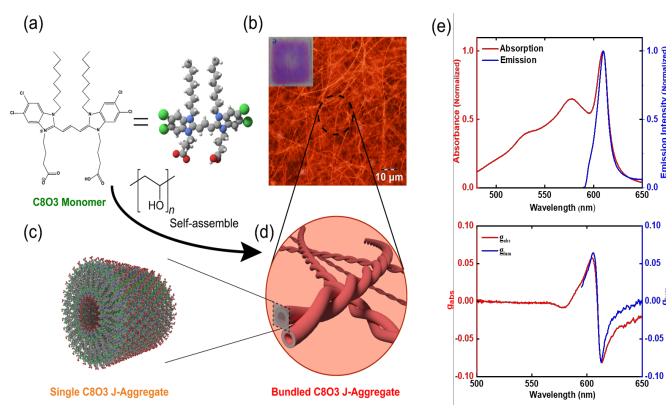
## Chiral Frenkel exciton strong coupling for intense bisignated circularly polarized luminescence

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**ABSTRACT:** Molecular aggregates with  $\pi$ - $\pi$  stacking of chromophoric units that show structure-dependent chiroptical properties are of great importance in prospective applications as CPL emitters. [1] C8O3, from the class of cyanine dyes, form tubular aggregates, that have shown fascinating ground state chiroptical features. [2] However, their excited state properties were not well explored due to various artifacts polluting the chiral signals. In this work, we extract the intrinsic chiral emissive signatures from twisted bundles of C8O3 tubular aggregates while correcting for various artifacts using Mueller polarimetry. As a result, we detect the bisignated CPL signal arising due to the strong coupling of chiral Frenkel excitons in these twisted bundles. We also identify these structures as a potential CPL emitter with high luminescence dissymmetry factor ( $g_{\text{lum}}$ ) of the order of 0.08. In addition, we show the quasi-perfect correlation of ground and excited state chiroptical signatures due to high structural rigidity. Moreover, by detecting the bisignated CPL, we identify the anti-Kasha emission

despite the small energy gap of 28 meV between electronic excited states. Apart from characterizing the chiroptical signatures of highly anisotropic supramolecular structures with low Stokes shift, we propose a new route to obtain intense bisignated CPL based on structural rigidity and chiral excitonic coupling.



**Figure:** chemical structure of C8O3 monomer (a), that self-assembles into tubular aggregates (c), which further form bundles (d) as seen in the dark field microscopic image (b). (e) The absorption and emission spectra (upper panel), and CD and CPL dissymmetry factor (lower panel) of bundled aggregates.

**KEY WORDS:** Frenkel exciton, bisignation, Mueller polarimetry, bundled aggregate

### References

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