Emissive Properties of Helicene Carbon Nanohoops

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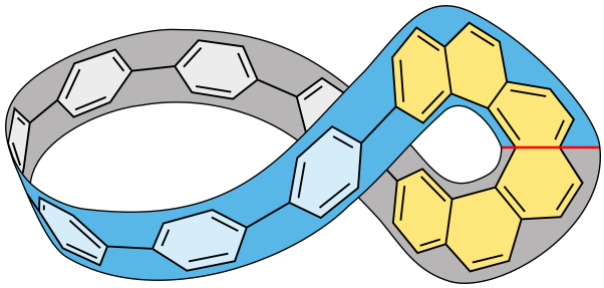
Helicenes are polyaromatic hydrocarbons consisting of *ortho*-fused benzene rings which adopt a helical screw-like shape.[1] They display strong chiroptical properties and circularly polarized luminescence although with a low quantum yield. Substantial synthetic modification of the helicene backbone is required in order to improve their emissive properties.[2]

On the other hand, cyclo-paraphenylenes ([*n*]CPPs) have been proven to have favorable luminescence properties, such as visible-light fluorescence with a high quantum yield, which is often preserved even in solid state.[3,4] However, the absence of chirality in CPPs prevent them to display circularly polarized luminescence. This could be circumvented by introducing a chiral unit to the structure of CPPs.[5]

In this contribution, the design and synthesis of helicene carbon nanohoops as chiral emitters that combine helicene scaffolds and [*n*]CPPs will be discussed.[6] The structure of the nanohoops was studied by single crystal X-ray diffraction, 1D and 2D nuclear magnetic resonance, and mass spectrometry and the photophysical properties investigated by absorption and emission spectroscopies. Helicene carbon nanohoops possess emission properties similar to symmetry-broken [*n*]CPPs. We have managed to obtain an enantiomerically pure sample of a helicene carbon nanohoop and study circularly polarized luminescence. Lastly, we discovered that helicene carbon nanohoops adopt Möbius topology in the solid state and in solution.



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