

Radical-based Nanoparticles with Advanced Optical Properties for Biological Applications

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Trityl-based radicals represent a unique case of organic free-radicals where a propeller-like conformation is responsible for the protection of the odd electron, mainly located in the central α -carbon. Among them, a special mention should be done for the perchlorotriphenylmethyl radical (PTM), which are particularly chemically stable due to the high steric hindrance provided by the chlorine atoms in ortho positions which protect their single unpaired electron localised on the central carbon atom. In addition to their inherent magnetic spin due to the unpaired electron, PTMs exhibit other appealing properties such as a rich electrochemistry, characteristic electronic and optical properties (absorption and emission) [1] and chirality and their derived applications which is still a field poorly exploited. Here, we review recent developments employing trityl-based radicals which include its structuration at the nanoscale as organic radical nanoparticles (OrNPs) [2] for two different applications; as efficient circularly polarized luminescence magnetic emitters [3] and as ratiometric nanothermometers in water for biological applications.

References

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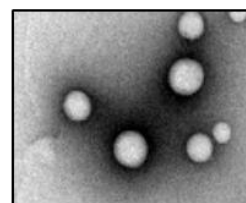
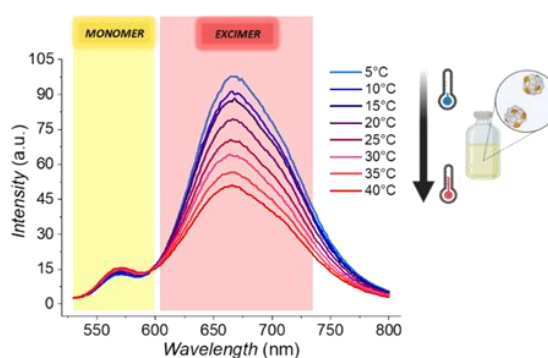
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Figures

Fluorescent radical NPs for nanothermometry



Enantiomeric radical NPs as circularly polarized emitters

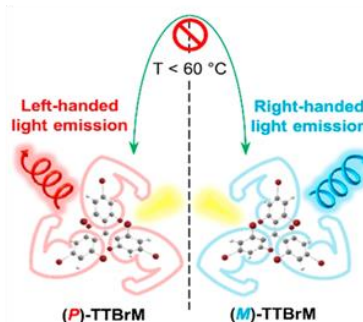


Figure 1. Top) Temperature-dependent fluorescence emission spectra of TTM radical doped OrNPs suspended in water; Bottom) Efficient circularly polarized luminescent magnetic emitters from enantiopure propeller-like trityl-brominated OrNPs with high racemization barrier.