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Triarylamine trisamide supramolecular polymers with circularly polarized emission

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ABSTRACT: Triarylamines are ubiquitous in the field of organic electronics due to their optoelectronic properties, which allow their subsequent use in devices such as organic light emitting diodes (OLEDs)[1,2] and solar cells.[3]

By decorating the triarylamine core with amide moieties, the resulting triarylamine trisamides (TATAs) gain the ability to self-assemble through hydrogen bonds and π-π stacking interactions, forming supramolecular helicoidal polymers with potentially multiple hierarchical levels of structuration (Figure 1).[4,5] The helicity of these polymers can be controlled by the introduction of a chiral bias close to the TATA core (*i.e.* the side chains).

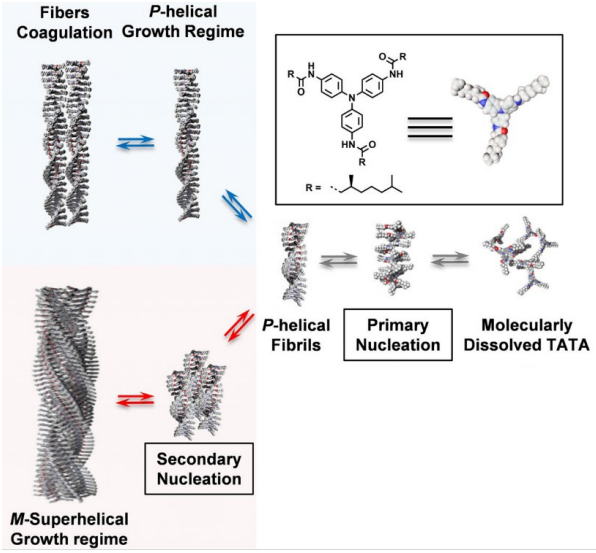

Figure 1: Self-assembly of TATAs in helical polymers. Adapted from ref. 4.

Here, we will report the characterization of chiral TATAs decorated with the photo-emissive tetraphenylethene (TPE) unit, which show circularly polarized light emission in their assembled form. We demonstrate that the triarylamine core can drive the assembly of the multi-chromophore system, direct its assembling conformation, and determine the preferential elliptical emission (Figure 2). We further investigate the limits of helicity transfer of the proposed systems, the mechanism behind their assembly, and the photophysical properties of these new polymers.

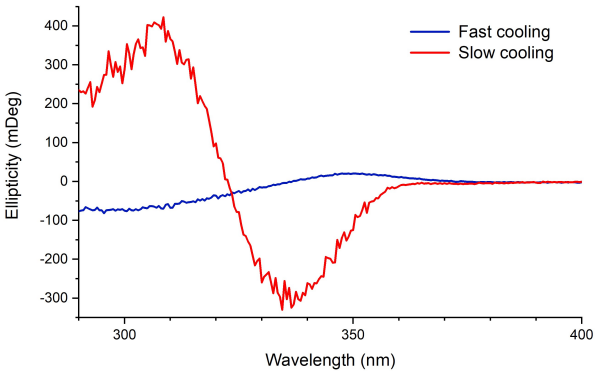

Figure 2: CD spectra of the assemblies after fast (thin fibers - blue) and slow (large bundles - red) cooling of a solution of chiral TATA-TPE in toluene.

KEY WORDS: supramolecular polymer, triarylamine trisamide

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