Chiral nanocomposites templated by liquid crystals: from chiral plasmonics to circularly polarized luminescence.

Abstract:

Thin films exhibiting chiroptical properties hold great potential for emerging photonic technologies relying on the emission or detection of circularly polarized light. However, to fully capitalize on their potential, further efforts are required to enhance, tune, and actively regulate the chiroptical activity. Recently, we addressed these challenges by relying on liquid crystals forming morphologically chiral structures, such as helical nanofibers. These organic materials guide the assembly of appropriately functionalized nanomaterials [1].

We have shown that this methodology is universal to Au nanoparticles and nanoclusters, as well as semiconductor and perovskite nanocrystals, enabling tuneability of the chiroptical properties [2-4]. Notably, the formed assemblies exhibit state-of-the-art high dissymmetry factors (*g*-factor on the order of 0.2). At the same time, the soft nature of the template ensures thermal, optical, and mechanical reconfigurability of the films' structure and optical properties [5,6]. These properties make the chiral films suitable for anticounterfeiting and multiplexed data transfer technologies [7].

In the last part of the talk, I would like to focus on bio-sensor applications of another class of chiral nanomaterials: Au nanoparticles with chiral shape [8, and unpublished data].

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