

Séminaire de Chimie Autour des Nanosciences

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DESIGN OF FUNCTIONAL NANOSTRUCTURES VIA CHIRALITY INDUCTION. TOWARDS NEW APPLICATIONS IN PHOTONICS AND MAGNETISM.

In the field of functional nano-materials, the chiral structures like helices or twisted ribbons are of great interest because of their optical and mechanical properties. In the present work, functional hybrid nano-helices are synthesized by use of organic chiral self-assemblies forming well-defined helix structures as templates. The mineralization of these self-assemblies allows creating silica nano-helices with controlled morphologies in term of diameter and pitches [1]. We also focus particularly on the formation of short helices (length control), individualized and well-dispersed in solution [2], and their hierarchical organization at a macrometric level.

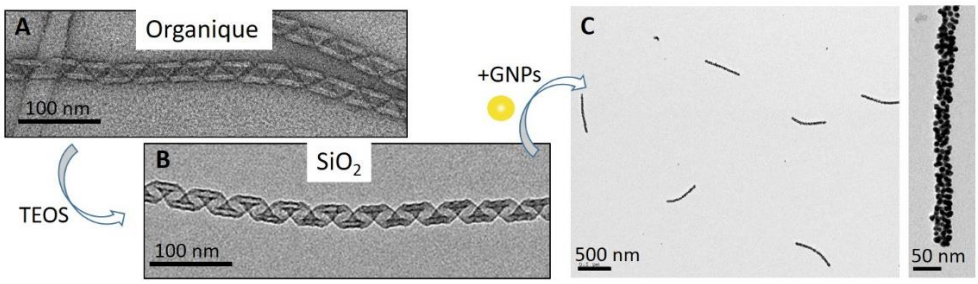


Figure. A- Amphiphile molecules self-assembly into nanometric chiral structures and B- their silica transcription. C- Grafting of gold nanoparticles.

These nanohelices are then used as template for the grafting of plasmonic nanoparticles or magnetic complexes to create photonic and magnetochiral devices [3]. Because the Gold@silica nanohelices synthesized are well dispersed, it is possible to align and organize them on different levels via Grazing Incidence Spraying processes, inducing a modulation of the photonic properties by the 2D and 3D organizations [4].

1. Delclos et al., NanoLetters 2008, 8(7), 1929-1935
2. Okazaki et al., ACS Nano 2014, 8(7), 6863-6872
3. Cheng et al. ACS Nano 2017, 11(4), 3806–3818
4. Gao et al. ACS Nano 2020, 14(4), 4111–4121

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