PhD. proposal

Molecule-induced chirality in CdSe nanoplatelets composite assemblies for magneto-chiral properties.

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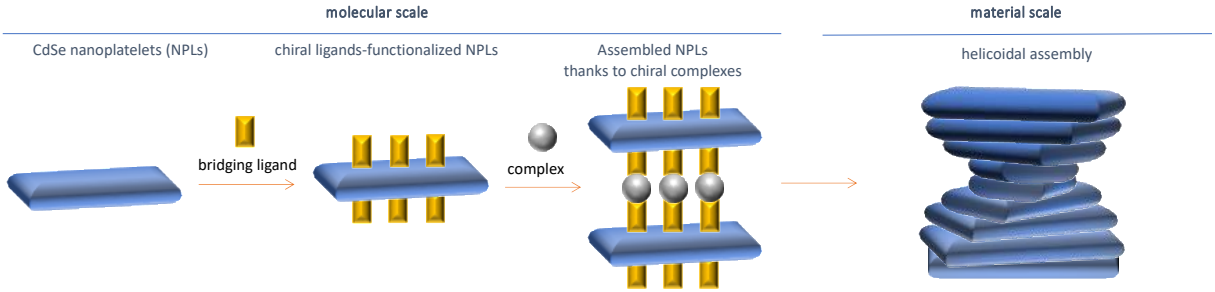
Key-words: nanoparticles, assembly, coordination chemistry, optical properties, chirality, luminescence, dichroism, magneto-chirality

The objective of this project is to manipulate the optical dichroic properties of CdSe nanoplatelets by triggering their assembly into helicoidal stacks thanks to intercalated chiral molecules and magnetic coordination compounds. Stacked CdSe nanoplatelets are known to propagate energy by FRET from a localized optical input along the direction of stacking.[1] The assemblies we propose will thus lead to composite materials with synergetic magneto-optical properties thanks to the coupling of energy levels between communicating NPLs and the intercalated coordination compounds.



CdSe nanoplatelets are semiconducting nanocrystals. The thickness of the platelets is controlled at the atomic layer scale during their synthesis.[2] That results in 1D quantum confinement that provides CdSe nanoplatelets unique optical properties such as unparalleled spectrally sharp and monodisperse luminescence in the visible region at discrete wavelength corresponding to their thickness. These nanoparticles will be functionalized by chiral molecules that will play a triple role: (*i*) inducing chirality to the nanoparticles for dichroic optical properties,[3] (*ii*) triggering the assembly of the nanoplatelets into helicoidal stacks to amplify the properties, (*iii*) induce paramagnetism for magneto-chiral properties.

This project is an interdisciplinary project at the edge between colloidal and coordination chemistry on one side and optical properties of nanomaterials on the other side. It will be conducted in collaboration between the ERMMES group at IPCM and the Nano Photo-phononics group at INSP**. In order to perform the synthesis of the nanostructures that we target, we are looking for a student holding a Master degree in Chemistry with good synthetic skills. Nonetheless, the candidate should have a strong interest in measuring and understanding the physical properties of materials.**

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