

Proposition de thèse au Centre de Recherche Paul Pascal

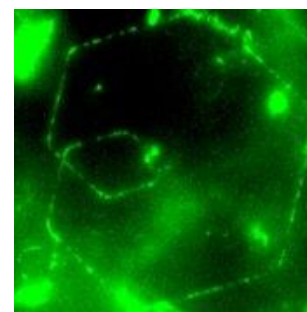
ACTIVE MICROSCOPIC SYSTEMS AND THEIR COLLECTIVE BEHAVIOR

Research Project:

The PhD project deals with the formation and the phase behavior study of new class of virus based particles, and their use as self-propelled or active systems. Specifically, the regio-functionalization of a model system of colloidal rods (i.e. filamentous fd viruses) with metallic nanoparticles (Au, Pt, etc) has been successfully performed through self-assembly processes to get hybrid scepter-shaped particles. The self-organization and phase behavior of these new colloidal particles will be investigated, using mainly optical techniques such as fluorescence microscopy and light scattering. Single particle tracking will be done to determine the dynamics of the system. Composites formed by these hybrid scepter-shaped particles dispersed in a matrix of colloidal liquid crystals will be achieved by to probe the influence of the local order in the self-organization process as well as the influence of entropic patchiness (i.e. depletion interaction). The manipulation of the resulting self-assemblies will be performed thanks to optical tweezers available in our lab. Last but not least, these hybrid particles will be studied as active (or self-propelled) system by varying the experimental conditions (either chemical fuel for Pt based system or light field for Au based ones) to understand collective effect in strongly anisometric active colloids.

References:

- S. Naderi, *et al.*, *Phys. Rev. Lett.* 111, 037801 (2013).
 E. Grelet, *Phys. Rev. X* 4, 021053 (2014).
 E. Grelet, R. Rana, *Soft Matter* 12, 4621 (2016).
 L. Alvarez, M.P. Lettinga, E. Grelet, *Phys. Rev. Lett.* 118, 178002 (2017).
 A. de la Cotte, C. Wu, M. Trévisan, A. Repula, E. Grelet, *ACS Nano* 11, 10616 (2017).
 B. Sung, A. de la Cotte, E. Grelet, *Nature Communications* 9, 1405 (2018).



Auto-assemblage hexagonal de virus présentant un défaut topologique.

Profil recherché : Physicien de la matière molle, ayant un goût pour l'expérimentation et la modélisation, ainsi que le travail multidisciplinaire (interface physico-chimie/biologie).

Financement : bourse au mérite de l'Université de Bordeaux pour excellents candidats externes.

Date limite : fin juin.

Information : Eric Grelet, grelet@crpp-bordeaux.cnrs.fr

Centre de Recherche Paul-Pascal, C.N.R.S. – Université de Bordeaux

115 Avenue Albert Schweitzer, 33600 Pessac, France

Tel: 05 56 84 56 13

<http://www.crpp-bordeaux.cnrs.fr/spip.php?article929>