Seminario

Università degli Studi di Padova
Dipartimento di Scienze Chimiche

Ciclo di Seminari 'Frontiers in Chemistry'

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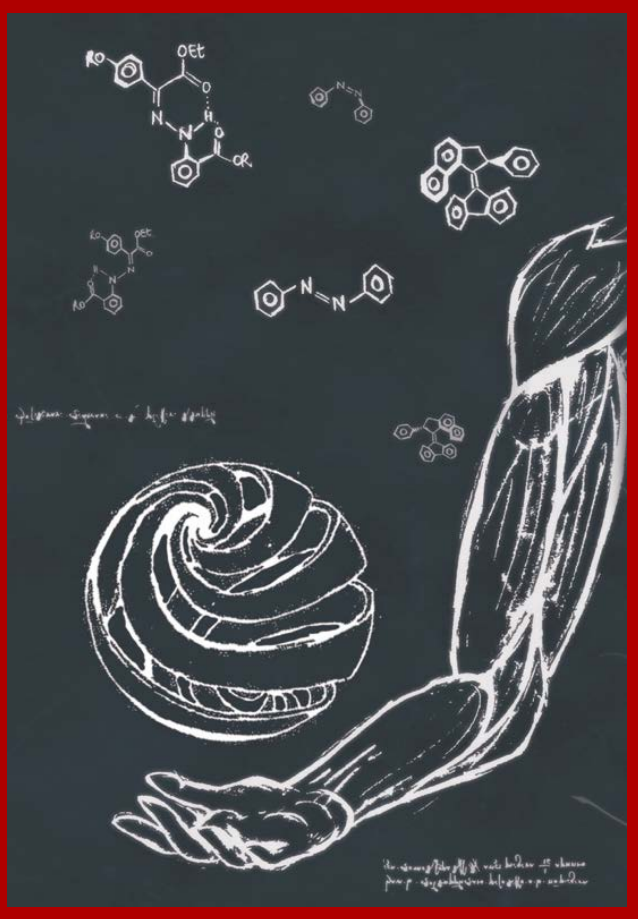
Setting molecular chemistry in motion

Mercoledì 23 Ottobre 2019, ore 15.00
Aula I, Dipartimento di Scienze Chimiche, Via Marzolo 1 - Padova

Abstract:
Movement is a hallmark of life, yet the mechanisms by which purposeful movement emerges at larger length scales, solely from the chemistry of molecules, remain mostly unknown [1]. In this contribution I will discuss two chemical systems in which macroscopic and directional motion of droplets emerges from coupling chemical reactions with supramolecular assemblies. Based on how fundamental replication is to biology, it is likely that self-replicating systems, where molecules facilitate their own formation or "make themselves" have played a key role in the emergence of life on Earth. In investigating the replicator-driven motility of droplets in water, we have unraveled mutualism between droplet motion and molecular chemistry [2]. Notably, the vast majority of aquatic microorganisms and cells swim along helical trajectories, including zooplankton, ciliates and bacteria.[3] Whilst the evolutionary advantage of motion along helical pathways remains unclear, it is certain that this motile behavior is associated with persistence in directionality, in other words helical motion is less sensitive to extracellular and intracellular random variations, compared to rectilinear motion. While exploring the relationship between the chirality of liquid crystal droplets and the specifics of their propagation along helical trajectories, we have discovered that light-driven molecular motors can steer the motile behavior of chiral droplets, with a sense of directionality [4].



[1] F. Lancia. A. Ryabchun, N. Katsonis, Nat. Rev. Chem. 2019, 10.1038/s41570-019-0122-2.
[2] D. Babu, R. J. H. Scanes, R. Plamont, A. Ryabchun, F. Lancia, T. Kudernac, S. P. Fletcher, N. Katsonis, sub judice.
[3] D. Bray. Cell movements : from molecules to motility. (Garland Science, 2000).
[4] F. Lancia, T. Yamamoto, A. Ryabchun, T. Yamaguchi, M. Sano, N. Katsonis, sub judice.

La presenza della S. V. sarà molto gradita.

Prof. Michele Maggini
Direttore del Dipartimento
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