



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

HORIZON EUROPE  
PROJECTS FUNDED AT THE UNIVERSITY OF PADOVA

### **brightLINK - Light-induced macroscopic assembly under dissipative conditions: communication between artificial swimmers**

Nature exploits transient self-assembled architectures that require a continuous input of energy to express functional properties across length scales. The development of synthetic mimics of such non-equilibrium systems provides access to innovative materials with life-like properties, which respond to external stimuli while adapting their structure. However, the production of macroscopic building blocks that self-assemble under dissipative conditions to display emergent functionalities remains an ongoing challenge. This multidisciplinary project aims to create a macroscopic self-assembling system that shows communication between the constituent artificial building blocks under dissipative conditions. In particular, swimmers that self-assemble under light irradiation are exploited as a minimalistic model of responsive macroscopic matter with dissipative characteristics. Light induces the swimmer locomotion, concomitantly providing energy to allow the anchoring between them. Thanks to a reaction-diffusion network, a successful connection is signalled by fluorescence emission confined at the interface of the interlinked swimmers. Due to the nonequilibrium state, the fluorescence is maintained when light is removed and the assembled structure slowly relaxes back to individual entities (no emission). Upon re-establishing the illumination, the cycle is repeated. These results make a leap from passive building blocks to dynamic molecular systems to macroscopic functional matter with embedded networks. This MSCA project will be performed at the Aizenberg and Prins groups, where I will enrich his scientific background with acquired knowledge in adaptive materials and dissipative systems. Moreover, I will improve my leadership, management and teaching skills with the proposed training activities and by closely working with both Supervisors. Ultimately, this MSCA will allow me to become an established researcher in a highly competitive scientific environment.

**UNIPD Supervisor:** Leonard Prins

**MSCA Fellow:** Jacopo Movilli

**Department:** Department of Chemical Sciences

**Coordinator:** Università degli Studi di Padova (Italy)

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