Abstract Submitted
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Light-structured colloidal assemblies[1] ANTOINE AUBRET, UCSD, YOUSSEF MENA, NYU department of Chemistry, SOPHIE RAMANANARIVO, UCSD, STEFANO SACANNA, NYU department of Chemistry, JEREMIE PALACCI, UCSD, PALACCI LAB TEAM, SACANNA LAB TEAM — Self-propelled particles (SPP) are a key tool since they are of relative simplicity as compared to biological micro-entities and provide a higher level of control. They can convert an energy source into motion and work, and exhibit surprising non-equilibrium behavior. In our work, we focus on the manipulation of colloids using light. We exploit osmotic and phoretic effects to act on single and ensemble of colloids. The key mechanism relies on the photocatalytic decomposition of hydrogen peroxide using hematite, which triggers the motion of colloids around it when illuminated. We use hematite particles and particles with photocatalytic inclusions (i.e. SPP). We first show that the interactions between hematite and colloidal tracers can be tuned by adjusting the chemical environment. Furthermore, we report a phototaxic behavior (migration in light gradient) of the particles. From this, we explore the effect of spatio-temporal modulation of the light to control the motion of colloids at the single particle level, and to generate self-assembled colloidal structures through time and space. The so-formed structures are maintained by phoretic and hydrodynamic forces resulting from the motion of each particles. Ultimately, a dynamic light modulation may be a route for the creation of active colloidal motion on a collective scale through the synchronization of the individual motions of SPP.

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