Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Self-assembling complex and functional structures at the (sub)millimeter scale VANDEWALLE NICOLAS, YLONA COLLARD, GALIEN GROSJEAN, University of Liege, GRASP, Institut de Physique B5a — When soft ferromagnetic particles are suspended at air-water interfaces in the presence of a vertical magnetic field, dipole-dipole repulsion competes with capillary attraction such that structures self-assemble. The complex arrangements of such floating bodies are emphasized. By adding a horizontal and oscillating magnetic field, periodic deformations of the assembly are induced. We show herein that collective particle motions induce locomotion at low Reynolds number. The physical mechanisms and geometrical ingredients behind this cooperative locomotion are identified. These physical mechanisms can be exploited to much smaller scales, offering the possibility to create artificial and versatile microscopic swimmers. Moreover, we show that it is possible to generate complex structures that are able to capture particles, perform cargo transport, fluid mixing, etc...

Vandewalle Nicolas
University of Liege

Date submitted: 23 Jul 2019 Electronic form version 1.4