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Active trapping of microswimmers in a foam FLORENCE ELIAS[1], QUENTIN ROVEILLO, Paris Diderot University, JULIEN DERVAUX, CNRS, YUXUAN WANG, Paris Diderot University, FLORENCE ROUYER, University Gustave Eiffel, DRAZEN ZANCHI, Paris Diderot University, LAURENT SEURONT, CNRS — Inspired by the consequences of aquatic foams on planktonic ecosystems, we have studied the sedimentation of a microswimmer in a liquid foam. The model unicellular bi-flagellated *Chlamydomonas reinhardtii* (CR) algae was incorporated in a biocompatible foam, and the dynamics of cell sedimentation out of the foam was measured.[2] Due to gravity, the liquid in a freshly formed foam flows downwards, advecting solid particles. The cells eventually reach the underlying liquid, escaping the foam. Comparing the dynamics of living and dead CR cells in a draining foam, we found that dead cells were totally advected by the flow, as expected for passive solid particles of this size (10 μm). In contrast, living motile CR cells escape the foam significantly much slowly: two hours after the foam formation, a significant fraction of cells remained blocked in the foam, whereas 95% of the volume of liquid initially contained in the foam the liquid was released. Microscopic observation of the swimming CR cells in a chamber mimicking the cross-section of a foam channel revealed that the microswimmers accumulate near channels corners, potentially increasing their retention in the foam.

[1]Laboratoire Matire et Systmes Complexes (MSC)
[2]Roveillo et.al., 2020. J. R. Soc. Interface 17 : 20200077.

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