Abstract Submitted
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Sisyphus at the Nanoscale: Bacterial Topotaxis in a Microfabricated Environment[1] GUILLAUME LAMBERT, Princeton University, PETER GALAJDA, TU Delft, DAVID LIAO, ROBERT H. AUSTIN, Princeton University — The ballistic-like motion of self-propelled particles at low-Reynolds number can be exploited to influence their direction of motion. In particular, it has been demonstrated that by using the right topology (in this case a micro-fabricated array of funnel-like asymmetrical barriers), *E.coli* bacteria can be "pumped" between two adjacent regions (Galajda 2007, Wan 2008). We built upon this idea and developed a micro-habitat array in which chemotaxis and topotaxis –nutrient- and topology-driven motion, respectively– are in opposition, leading to an inherently unstable environment in which a bacterium is constantly pushed away from the fitness landscape's summit in a Sisyphean fashion. Surprisingly, we find that the bacterial population as a whole is able to overcome the rectifying array. An in-depth microscopic analysis of the swimmer's motion is used to quantify the strategies adopted by the bacteria.

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