Abstract Submitted
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Metallic microswimmers driven up the wall by gravity[1] FLORENCIO BALBOA USABIAGA, Basque Center for Applied Mathematics, QUENTIN BROSSEAU, Department of Mechanical Engineering Applied Mechanics, University of Pennsylvania, ENKELEIDA LUSHI, Department of Mathematics, New Jersey Institute of Technology, YANG WU, Department of Chemistry, New York University, LEIF RISTROPH, Courant Institute, New York University, MICHAEL D. WARD, Department of Chemistry, New York University, MICHAEL J. SHELLEY, Flatiron Institute, Simons Foundation, JUN ZHANG, Courant Institute, New York University — As a natural and functional behavior, various microorganisms exhibit gravitaxis by orienting and swimming upwards against gravity. We study the swimming of autophoretic nanomotors, which are bimetallic and rod-shaped particles, and find that when moving near inclined walls, these tail-heavy rods preferentially orient upwards and swim up along the wall. Through experiment and theory, we identify two mechanisms that contribute to their gravitactic behavior. First, a buoyancy or gravitational torque acts on these rods to align them upwards. Further, hydrodynamic interactions of the rod with the inclined wall induce a fore-aft drag asymmetry on the rods that reinforces their orientation bias and promotes their upward motion.

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