Abstract Submitted
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Magnetic Actuation of Self-assembled Bacteria Inspired Nanoswimmers[1] JAMEL ALI, Drexel University, U KEI CHEANG, South University of Science and Technology, JAMES D. MARTINDALE, MEHDI JABBARZADEH, HENRY C. FU, University of Utah, MIN JUN KIM, Southern Methodist University — Currently, there is growing interest in developing nanoscale swimmers for biological and biomedical tasks. Of particular interest is the development of soft stimuli-responsive nanorobots to probe cellular and sub-cellular environments. While there have been a few reports of nanoscale robotic swimmers, which have shown potential to be used for these tasks, they often lack multifuctionality. In particular, no man-made soft nanoscale material has been able to match the ability of natural bacterial flagella to undergo rapid and reversible morphological changes in response to multiple forms of environmental stimuli. Towards this end, we report self-assembled stimuli-responsive nanoscale robotic swimmers composed of single or multiple bacterial flagella and attached to magnetic nanoparticles. We visualize the movement of flagella using high resolution fluorescence microscopy while controlling these swimmers via a magnetic control system. Differences in in propulsion before and after the change in flagellar form are observed. Furthermore, we demonstrate the ability to induce flagellar bundling in multiflagellated nanoswimmers.

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