Abstract Submitted
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Swimming in Semi-Synthetic Mucus[1] LOUIS ROGOWSKI, BENJAMIN WOODRUFF, AMANDA LIEW, RICHARD BURNS, Southern Methodist Univ, JAMEL ALI, Drexel University, HOYEON KIM, MINJUN KIM, Southern Methodist Univ — Leveraging the fluid properties of human mucus is instrumental to perfecting artifical in vivo microscale swimming. Fiber networks, composed of mucin proteins, are the primary component contributing to mucus's viscoelastic properties. In addition to creating extreme bulk fluid properties, the fibers can cause microparticles to become entangled. Through experimentation, it was determined that magnetic three bead microrobotic swimmers are incapable of translational motion below a 7 Hz rotating magnetic field frequency. At higher mucus concentrations, three bead swimmers are tougher to form due to mucin fiber interference. However, entanglements with fibers allow two bead swimmers and single particles to be capable of translational motion; which is otherwise not possible in Newtonian fluids. Two bead swimmers have been demonstrated to be consistently controllable and perform well in even high mucus concentrations. Single particles have been observed to occasionally form mucin tails, creating a hybrid microswimmer. These novel mucus interactions allow for increased adaptability of microswimmers and provide a better understanding of in vivo fluid dynamics.

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