Abstract Submitted
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Magnetic Particle Dynamics in Synthetic Mucus[1] LOUIS ROGOWSKI, BENJAMIN WOODRUFF, AMANDA LIEW, RICHARD BURNS, HOYEON KIM, Southern Methodist Univ, JAMEL ALI, Drexel University, MINJUN KIM, Southern Methodist Univ — The viscoelastic nature of human mucus is the result of complex fiber networks generated by mucin glycoproteins. Micro- and nanoparticles easily become entangled within these fiber networks, causing reduced particle diffusivity. Actuatable magnetic microparticles entangled within these fibers, in certain cases, have been demonstrated to have novel interactions with surrounding mucus environments. Individual particles have been observed to form mucin fiber tails that allow them to swim freely through the medium. Particles bonded with mucin fibers can also experience new forms of controllable motion, like z-plane shifting and wobble swimming, not previously encountered in past work. In high density fiber networks, microparticles are observed to gradually roll themselves through the networks by simple directional rotation. In lower concentrations of mucus, particles can have sudden and rapid translator properties when encountering dense patches of fibers. Understanding these unique fluidic interactions inside synthetic mucus can greatly contribute to in vivo fluid dynamics, pharmacology, and microrobotics.

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