Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Simple low Reynolds number microswimmers U KEI CHEANG, Drexel University, MIN JUN KIM, Southern Methodist University — An extremely simple low Reynolds number microswimmer had been observed to swim in bulk fluid. The development of microscopic swimmers had been hindered by technical limitations in micro- and nanofabrication. To address this practical problem, the minimal geometrical requirements for swimming in low Reynolds number has been investigated. Micro- and nanofabrication of complex shapes with specialized materials, such as helices or flexible bodies, on a massive scale requires sophisticated state of the art technologies which have size limitations. In contrast, simple shaped structures, such as spherical particles, can be synthesized massively using chemical methods with relative ease at low costs. In this work, simple microswimmers were fabricated by conjugating two microbeads with debris attached to their surface. The debris allow the 2-bead structures to have two or more planes of symmetry, thus, allowing them to swim in bulk fluid at low Reynolds number. The microswimmers are magnetically actuated and controlled via a rotating magnetic field generated by an electromagnetic coil system. The microswimmers' velocity profiles had been characterized with respect to increasing rotating frequency. Furthermore, the motion of the microswimmers were analyzed using image processing. Finally, their swimming capability had been shown through experiments by steering the microswimmers in any desired direction.

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Date submitted: 19 Sep 2016 Electronic form version 1.4