Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Self-assembled Colloidal Walkers: from Single Chain Motion to Controlled Surface-Induced Flows CHARLES SING, ALFREDO ALEXANDER-KATZ, Massachusetts Institute of Technology — Biological flows at the microscopic scale are important for the transport of nutrients, locomotion, and differentiation. Here, we present a novel approach for creating controlled surface-induced flows inspired by a ubiquitous biological system, cilia. Our design is based on a collection of self-assembled colloidal rotors that "walk" along surfaces in the presence of a rotating magnetic field. These rotors are held together solely by magnetic forces, which allow for reversible assembly and disassembly of the chains. Furthermore, rotation of the magnetic field allows for straightforward manipulation of the shape and motion of these chains. This system offers a simple and versatile approach for designing novel microfluidic devices as well as for studying fundamental questions in cooperative driven motion and transport at the microscopic level.

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Date submitted: 13 Nov 2009 Electronic form version 1.4