Abstract Submitted
for the DFD20 Meeting of
The American Physical Society

Motion of conjoined spheres in Stokes flow VINEETH CHANDRAN SUJA, Stanford Univ — Motivated by the emergence of new drug delivery techniques employing backpacks attached to macrophages (WBCs) and erythrocytes (RBCs), we study theoretically and numerically the motion of conjoined objects in Stokes flow. As a first approximation, the cells and backpacks are modeled as non-deformable conjoined spheres. The motion of this simplified system is investigated, and the resulting velocity and pressure fields are evaluated for a range of physiologically relavent conditions. Of particular interest, is the net disjoining force that acts to separate the conjoined spheres. In the physiological case, the backpacks separate from the cells when the disjoining force exceeds the adhesive force between the two. We report the important disjoining force as a function of physically relavent variables such as the sphere size ratios, sphere orientations and the center to center distance between the spheres. We believe the results from this study will improve our understanding of the conditions that lead to cell-backpack seperation, and will aid the further development of backpack mediated drug delivery.

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Date submitted: 30 Jul 2020 Electronic form version 1.4