Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

CO_2-driven diffusiophoresis: motion of charged particles near CO_2 dissolving boundaries[1] SUIN SHIM, Princeton University, OREST SHARDT, University of Limerick, SEPIDEH KHODAPARAST, Imperial College London, CHING-YAO LAI, Columbia University, JESSE T. AULT, Brown University, BHARGAV RALLABANDI, University of California, Riverside, HOWARD A. STONE, Princeton University — We present experimental and theoretical investigations for CO_2-driven diffusiophoresis of charged particles. An aqueous suspension of charged particles initially in contact with a CO_2 dissolving interface shows directional migration either up or down the concentration gradient, depending on the particle charges. We use a cylindrical CO_2 bubble in a circular Hele-Shaw cell to study the behavior of polystyrene particles. By experiments and numerical model calculations considering multicomponent gas dissolution, we prove the diffusiophoretic accumulation and exclusion of particles near the bubble interface. Then using two geometrical conditions with moving and fixed boundaries, we show diffusiophoresis of bacterial cells driven by dissolution of CO_2. *Vibrio Cholerae*, a Gram-negative bacteria, has a negative surface charge and thus migrates away from a CO_2 source. Using PIV we show behaviors of wild type cells and a mutant lacking flagella, suggesting that CO_2-driven diffusiophoresis may prevent biofilm formation by reducing the population of cells approaching an interface.

[1]We acknowledge the NSF for support via grant CBET-1702693.

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Date submitted: 25 Jul 2019 Electronic form version 1.4