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Mathematical modeling of the motion of soft biological particles during insulator based dielectrophoresis NAGA NEEHAR DINGARI, CULLEN R. BUIE, Massachusetts Institute of Technology — We present a theoretical model to investigate the effects of soft polyelectrolyte layers and bulk ionic concentration on the motion of biological particles such as bacteria in insulator based dielectrophoresis (iDEP) [1] devices. The polarizabilities and electrophoretic mobilities are calculated by solving modified Poisson-Nernst-Plank equations [2] (for ionic transport) and modified Stokes equations (for fluid flow) around the soft particle. The details of soft layer are modeled by including dissociation of ionogenic groups within soft layer and specific interactions with the background electrolyte. We consider two test cases: fibrillated and unfibrillated bacteria whose mobilities were analyzed theoretically and experimentally by Duval et.*al* [3]. We consider a wide range of bulk electrolyte concentration to include thin and thick double layer cases. As a consequence of our analysis we highlight an interesting interplay between soft layer conductivity (function of pH, pKa of ionogenic groups) and double layer conductivity (function of bulk electrolyte concentration) on the particle trajectories in an iDEP device.

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[2] Duval, J. F. L.; Ohshima, H. *Langmuir* **2006**, *22*, 3533–46.
[3] Duval, J. F. L.; Busscher, H. J.; van de Belt-Gritter, B.; van der Mei, H. C.; Norde, W. *Langmuir* **2005**, *21*, 11268–82.

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