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The influence of soft layer electrokinetics on bacterial electroporation JEFFREY MORAN, NAGA NEEHAR DINGARI, CULLEN BUIE, Massachusetts Institute of Technology — Electroporation of mammalian cells has received a significant amount of theoretical attention over the last decade because of its ability to deliver biologically active molecules into cells using short and strong electric field pulses. However, application of the same theory to bacterial electroporation presents significant challenges because of the presence of charged soft layers around bacteria. The soft layer charge distribution has been found to significantly influence bacterial electrophoretic mobility and polarizability because it alters the electric potential spatial distribution around the cell envelope. In addition, the RC charging time scale of both the soft layer and electric double layer is of the order of microseconds, which is also of similar order of magnitude as the pore creation time scale. Therefore in this study, we investigate the influence of soft layer electrokinetics on the spatial pore distribution and the temporal pore radius evolution during bacteria electroporation, which are quantitative measures of a bacterium's amenability to electroporation. The study will have significant impact on designing and optimizing bacteria electroporation platforms for gene and drug delivery applications.

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