

Abstract Submitted  
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**To biofilm or not to biofilm: the autoinducer-yield parameter for determining biofilm formation** SELENA CHIU, JENNA OTT, DANIEL AMCHIN, TAPOMOY BHATTACHARJEE, SUJIT DATTA, Princeton University — Bacteria form biofilms in a host of organic environments, from soil to the mammalian gut. While biofilms assist in remediating soil contaminants, they also cause infection, from chronic lung infections in cystic fibrosis patients to industrial biofouling. It is, thus, vital to understand factors regulating the extent of biofilm formation to develop potential treatments for better human and environmental health. Unfortunately, little is known about the transition of free-swimming planktonic bacteria to sedentary biofilms in these environments. Here, we simulate bacterial behavior in heterogeneous media to investigate the competition between bacterial dispersal, governed by chemotaxis, and biofilm formation, triggered by autoinducer accumulation. My work in this project focuses on characterizing the competition between bacterial cell yield and autoinducer secretion in determining the extent of biofilm formation. By simulating bacterial activity while varying cell yield and autoinducer secretion, I determined an autoinducer-yield parameter quantitatively predicts the extent of biofilm formation given the rate of cell yield and autoinducer secretion. Simulation results demonstrate a critical value at which biofilm formation transitions from continuum to step-like behavior.

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