

Abstract Submitted  
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**Mechanics of bacterial biofilm expansion: differentiation and nutrient deprivation** AGNESE SEMINARA, TOMMY ANGELINI, School of Engineering and Applied Sciences, Harvard University, ROBERTO KOLTER, Harvard Medical School, Harvard University, DAVID WEITZ, MICHAEL BRENNER, School of Engineering and Applied Sciences, Harvard University — Biofilms are sessile colonies of micro-organisms, usually encased in a protective extracellular matrix and associated to a surface. Cells inside a biofilm differentiate in precise patterns in space and time, so that biofilms are often compared to multicellular organisms. Nutrient deprivation is thought to be the main trigger for the onset of differentiation. Here we explore this idea quantitatively by modeling the mechanics of biofilm growth coupled to reaction and diffusion of nutrient concentration. The results give insight on the time evolution of biofilm morphology and provides a quantitative description of the stresses developed within the biofilm during expansion. We develop a theoretical framework applicable to a variety of microorganisms and compare the predictions to time-lapse microscopy data on *Bacillus Subtilis* biofilms.

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