

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Matrix Production in Response to Nutrient Depletion in *Bacillus Subtilis* Biofilms THOMAS ANGELINI, MICHAEL BRENNER, DAVID WEITZ, SEAS, Harvard — Encasing the cells that comprise a bacterial biofilm, the extracellular polysaccharide (EPS) matrix may serve several purposes in biofilm development and survival. One class of examples involves adhesion; the EPS can contribute to cell-cell adhesion and cell substrate adhesion. In contrast to biofilm expansion by proliferation, which produces more nutrient consumers, EPS production could be an alternative, more efficient method of biofilm expansion. The recent work of Vlamakis, et al (2008) demonstrated a transition in the rate of EPS production during biofilm growth. At early stages of development, when the biofilm is thin, a low level of matrix is expressed. At later stages, when the biofilm has thickened, EPS production is dramatically increased. This transition could be a response to nutrient depletion, as there must be a critical biofilm thickness, above which nutrients cannot diffuse into the center of the biofilm before being consumed by cells at the edge. Here we quantify biofilm size and shape during the early stages of *Bacillus Subtilis* biofilm growth, simultaneously monitoring matrix expression levels. We show that the critical biofilm size scales with nutrient concentration as expected by a simple nutrient depletion model.

Thomas Angelini
SEAS, Harvard

Date submitted: 22 Nov 2008

Electronic form version 1.4