Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Morphodynamics of growing bacterial colony PUSHPITA GHOSH, PRASAD PERLEKAR, NAVDEEP RANA, TIFR Center for Interdisciplinary Sciences — Self-organization into multicellular communities is a natural trend of most of the bacteria. Mutual interactions and competition among the bacterial cells in such multicellular organization play essential role in governing the spatiotemporal dynamics. We here present the spatiotemporal dynamics of growing bacterial colony using theory and a particle-based or individual-based simulation model of nonmotile cells growing utilizing a diffusing nutrient/food on a semi-solid surface by their growth and division forces and by pushing each-other through sliding motility. We show how the resource competition over a fixed amount of food, the diffusion coefficient of the nutrient and the random genetic noise govern the morphodynamics of a single species and a well-mixed two-species bacterial colonies. Our results show that for a very low initial food concentrations, colony develops fingering pattern at the front, while for intermediate values of initial food sources, the colony undergoes transitions to branched structures at the periphery and for very high values of food colony develops smoother fronts.

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Date submitted: 09 Nov 2016 Electronic form version 1.4