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Biomechanical ordering and buckling due to microbial growth confined at oil-water interfaces GABRIEL JUAREZ, ROMAN STOCKER, ETH Zurich — Bacteria are unicellular organisms that often exist as densely populated, surface-associated communities. Bacteria are also environmental colloids and spontaneously attach and self-assemble at liquid-liquid interfaces. Here, we present results on the growth dynamics of individual rod-shaped bacteria confined to finite oil-water interfaces of varying curvature. Through experiments using microfluidic chambers and time-lapse microscopy, we study the formation of macroscopic structures observed as adsorbed bacteria grow, divide, and self-assemble in a nematic phase due to biomechanical interactions. The continued growth at the interface leads to a jammed monolayer of cells, which then causes the interface to buckle and undergo large deformations including wrinkling and tubulation. These observations highlight the interplay between physical environment, such as confinement and interface curvature, and active biological processes, such as growth, at the scale of individual agents and shape our understanding of macroscale processes such as microbial degradation of oil in the ocean.

Gabriel Juarez
ETH Zurich

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