

Accepted Manuscript

Films of Bacteria at Interfaces

Liana Vaccari, Mehdi Molaei, Tagbo H.R. Niepa, Daeyeon Lee, Robert L. Leheny, Kathleen J. Stebe

PII: S0001-8686(17)30237-3
DOI: doi: [10.1016/j.cis.2017.07.016](https://doi.org/10.1016/j.cis.2017.07.016)
Reference: CIS 1801

To appear in: *Advances in Colloid and Interface Science*



Please cite this article as: Vaccari Liana, Molaei Mehdi, Niepa Tagbo H.R., Lee Daeyeon, Leheny Robert L., Stebe Kathleen J., Films of Bacteria at Interfaces, *Advances in Colloid and Interface Science* (2017), doi: [10.1016/j.cis.2017.07.016](https://doi.org/10.1016/j.cis.2017.07.016)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Films of Bacteria at Interfaces

Liana Vaccari^a, Mehdi Molaei^a, Tagbo H. R. Niepa^a, Daeyeon Lee^a, Robert L. Leheny^b, Kathleen J. Stebe^{a,*}

^a*Department of Chemical and Biomolecular Engineering, University of Pennsylvania, Philadelphia, PA 19104, USA*

^b*Department of Physics and Astronomy, Johns Hopkins University, Baltimore, MD 21218, USA*

Abstract

Bacteria are often discussed as active colloids, self-propelled organisms whose collective motion can be studied in the context of non-equilibrium statistical mechanics. In such studies, the behavior of bacteria confined to interfaces or in the proximity of an interface plays an important role. For instance, many studies have probed collective behavior of bacteria in quasi two-dimensional systems such as soap films. Since fluid interfaces can adsorb surfactants and other materials, the stress and velocity boundary conditions at interfaces can alter bacteria motion; hydrodynamic studies of interfaces with differing boundary conditions are reviewed. Also, bacteria in bulk can become trapped at or near fluid interfaces, where they colonize and form structures comprising secretions like exopolysaccharides, surfactants, living and dead bacteria, thereby creating Films of Bacteria at Interfaces (FBI). The formation of FBI is discussed at air-water, oil-water, and water-water interfaces, with an emphasis on film mechanics, and with some allusion to genetic functions guiding bacteria to restructure fluid interfaces. At air-water interfaces, bacteria form pellicles or interfacial biofilms. Studies are reviewed that reveal that pellicle material properties differ for different strains of bacteria, and that pellicle physicochemistry can act as a feedback mechanism to regulate film formation. At oil-water interfaces, a range of FBI form, depending on bacteria strain. Some bacteria-laden

*Corresponding author

Email address: kstebe@seas.upenn.edu (Kathleen J. Stebe)

Download English Version:

<https://daneshyari.com/en/article/4981428>

Download Persian Version:

<https://daneshyari.com/article/4981428>

[Daneshyari.com](https://daneshyari.com)