

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Shear-induced adhesion of bacterial cells¹ SIGOLENE LECUYER, ROBERTO RUSCONI, YI SHEN, ALISON FORSYTH, Harvard University, HOWARD STONE, Princeton University — Bacterial adhesion is the first step in the development of surface-associated communities known as biofilms. The formation of these microbial structures is the cause of many different problems in medical devices and industrial water systems. Despite an extensive literature, the underlying mechanisms of the initial reversible attachment are not fully understood. We have investigated the effects of hydrodynamics on the probability of adsorption and detachment of bacteria on model surfaces by using phase-contrast microscopy in straight microchannels. In this way we have been able to measure the time that each bacterium spends on the surface and to analyze the mobility as a function of the flow rate. The main finding of our experiments and analyses is a counter-intuitive enhanced adhesion as the shear stress is increased over a wide range of shear rates.

¹This work was supported by BASF via the BASF Advanced Research Initiative at Harvard University.

Howard Stone
Princeton University

Date submitted: 12 Aug 2009

Electronic form version 1.4