Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

The biofouling potential of flow on corrugated surfaces GASTÓN L. MIÑO, ROBERTO RUSCONI, Civil and Environmental Engineering, MIT, USA, VASILY KANTSLER, Department of Physics, University of Warwick, United Kingdom, ROMAN STOCKER, Institute of Environmental Engineering, ETH Zurich, Switzerland — Both natural and man-made surfaces are rarely smooth, and are instead often characterized by geometric heterogeneity or roughness over a broad range of scales. Because of the predicted importance of the local interaction between microorganisms and surfaces, roughness at the microbial scale can be an important element in determining the outcome of microbe-surface interactions, which represent the first step in biofilm formation and biofouling. In microbial habitats this interaction often occurs in flowing fluids, which can be important because regions with high hydrodynamic shear can induce a strong reorientation of bacteria towards surfaces, promoting attachment. Here we study the combination of flow and surface topography using video microscopy of *Escherichia coli* in corrugated microfluidic channels. We report that flow preferentially promotes attachment to specific regions of a corrugated surface, as result of the hydrodynamics of bacteria swimming in flow. We compute from the data a "Local Biofouling Potential" (LBP) and compare this successfully with predictions of a mathematical model, yielding one step towards the ability to mechanistically predict and thus ultimately either prevent or induce biofouling.

Gastón L. Miño
Massachusetts Inst of Tech-MIT

Date submitted: 31 Jul 2015 Electronic form version 1.4