

Biofilms and mechanics: Forces in Microbial Community



Biofilms are developmentally-dynamic communities of sessile microbes that adhere to each other and, often, to other structures in their environment. The cohesive mechanical forces binding microbes to each other confer mechanical and structural stability on the biofilm and give rise to biofilm viscoelasticity. The adhesive mechanical forces binding microbes to other structures in their environment can promote biofilm initiation and mechanosensing that leads to changes in biological activity. Thus, physical mechanics is intrinsic to characteristics that distinguish biofilms from free-swimming or free-floating microbes in liquid culture. However, very little is known about the specifics of what mechanical traits characterize different types of biofilms at different stages of development. Even less is known about how mechanical inputs impact microbial biology and how microbes can adjust their mechanical coupling to, and interaction with, their environment. These knowledge gaps arise, in part, from the challenges associated with experimental measurements of microbial and biofilm biomechanics. Here, I will present a combination between single molecule and macroscopic measurements leading to the investigation of bacterial biofilm mechanics at different stages. At the end of this talk I will indicate areas where significant advances in the state-of-the art are heading.

Dr. Touhami is a multidisciplinary biophysicist having more than 15 years of experience with the single molecule manipulation of biosurfaces. He has broad background and technical expertise in diverse areas of biophysics, biological physics, cell biology, nanobiotechnology, and biomaterials. Dr. Touhami had significantly contributed to the development of new methodologies to probe bacterial surface structures and dynamics in real time and under physiological conditions. With a strong passion in molecular biophysics, Dr. Touhami joined the Department of Physics & Astronomy at the University of Texas Brownsville as an Assistant-Professor in January 2009 and then as an Associate-Professor at the UTRGV on 2015. He completed several postdoctoral positions at the University of Guelph, Dalhousie University, and Louvain-La-Neuve University.