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Formation of Shear Resistant (SR-)Biofilm over chemically structured surfaces with self-assembled monolayer micro-patches in shear flows JIAN SHENG, MARYAM JALALI, Texas AM University — Biofilm consisting of structured bacterial communities protected cells from environmental insults such as antibiotics, biocides, and mechanical abrasions. Recent studies on near surface bacterial motility and biofilm responses to flow shear leads to hypothesis that substrate landscape (e.g. surface hydrophobicity, roughness, and chemistry) and hydrodynamic conditions (e.g. flow and shear) substantially affect the fundamental formation processes and cause the film to evolve to diametrically different mature biofilms. In this study, we apply our newly developed *Ecology-on-a-chip* (*eChip*) microfluidic microcosm platform and surface-patterning technique with OTS self-assembled monolayer micro-patches to study the role of surficial energy landscape and flow shear on 3D biofilm structures. *Pseudomonas* (PAO1) biofilm will be formed in-situ in t*eChip* platform with a SMA patterned bottom surface. The formation processes (e.g. attachment, proliferation, dispersal, regrowth) and the evolution of 3D film structures will be measured in the real-time as well as their capability of resisting shear will also be assessed and quantified. Funded by ONR

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