Abstract Submitted
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Bacterial floc mediated rapid streamer formation in creeping flows MAHTAB HASSANPOURFARD, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada, ZAHRA NIKAKHTARI, Department of Mechanical Engineering, University of Alberta, Edmonton, Canada, RANAJAY GHOSH, Department of Mechanical and Industrial Engineering, Northeastern University, Boston MA 02115, USA, SIDDHARTHA DAS, Department of Mechanical Engineering, University of Maryland, College Park, MD 20742, USA, THOMAS THUNDAT, Department of Chemical and Materials Engineering, University of Alberta, Edmonton, Canada, ALOKE KUMAR, Department of Mechanical Engineering, University of Alberta, Edmonton, Canada — One of the contentious problems regarding the interaction of low Reynolds number (Re<<1) fluid flow with bacterial biomass is the formation of filamentous structures called streamers. Recently, we discovered that streamers can be formed from flow-induced deformation of the pre-formed bacterial flocs over extremely small timescales (less than a second). However, these streamers are different than the ones that mediated by biofilms. To optically probe the inception process of these streamers formation, bacterial flocs were embedded with 200 nm red fluorescent polystyrene beads that served as tracers. We also showed that at their inception the deformation of the flocs is dominated by large recoverable strains indicating significant elasticity. These strains subsequently increase tremendously to produce filamentous streamers. At time scales larger than streamers formation time scale, viscous response was observed from streamers. Finally, rapid clogging of microfluidic devices occurred after these streamers formed.

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