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Viscoelasticity of a bacterial extracellular polymeric substance (EPS) streamer filament using micro-rheology and microfluidics ANDREW WHITE, MARYAM JALALI, JIAN SHENG, Texas A&M — Using *Ecology-on-a-chip* (eChip), we have demonstrated that polymeric aggregates can be formed around a rising oil micro-droplet by *Pseudomonas*. The EPS aggregate is initiated by forming trailing streamers with one end anchoring at the droplet surface and the other floating in the flow, which alters "wake" pressure field and consequently causes substantial drag on the drop. Experiments using *Alcarnivorex* and *Marinobacter* further reveal that although the formation of "streamers" is universal, its rheological characteristics vary significantly due to the EPS composition including polysaccharides, proteins, lipids and nucleic acids. To understand complex interactions of streamers and their surrounding shear flows, viscoelastic behavior of streamers must be understood. Here, we apply micro-rheology technique to quantify real-time viscoelasticity of streamers developed in a pinned oil droplet in *eChip*. Using high speed microscopy, filament strain is determined by tracking trapped bacteria in real-time and concurrently viscous stresses are measured using PIV-assisted PTV of freely suspended bacteria. Stress-strain shows hysteresis of viscoelastic materials. Funded by GoMRI, ARO

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