Flow induced streamer formation in particle laden complex flows NANDINI DEBNATH\textsuperscript{1}, MAHTAB HASSANPOURFARD\textsuperscript{2}, Univ of Alberta, RANAJAY GHOSHI\textsuperscript{3}, University of Central Florida, JAPAN TRIVEDI\textsuperscript{4}, THOMAS THUNDAT\textsuperscript{5}, ALOKE KUMAR\textsuperscript{6}, Univ of Alberta — We study the combined flow of a polyacrylamide (PAM)solution with polystyrene (PS) nanoparticles, through a microfluidic device containing an array of micropillars. The flow is characterized by a very low Reynolds number ($Re<<1$). We find that for exceeding a critical Weissenberg number ($Wi\geq 20$), PS nanoparticles localize near pillar walls to form thin slender string-like structures, which we call ‘streamers’ due to their morphology. Post-formation, these streamers show significant viscous behavior for short observational time-scales, and at longer observational time scales elastic response dominates. Our abiotic streamers could provide a framework for understanding similar structures that often form in biological systems.

\textsuperscript{1}PhD student, Department of Mechanical Engineering
\textsuperscript{2}PhD student, Department of Chemical and Materials Engineering
\textsuperscript{3}Assistant Professor, Department of Mechanical and Aerospace Engineering
\textsuperscript{4}Assistant professor, Department of Civil and Environmental Engineering
\textsuperscript{5}Professor, Department of Chemical and Materials Engineering
\textsuperscript{6}Assistant professor, Department of Mechanical Engineering