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Application of micro-PIV to the study of staphylococci bacteria biofilm dynamics ERICA SHERMAN, University of Nebraska - Lincoln, DEREK MOORMEIER, KENNETH BAYLES, University of Nebraska Medical Center, TIMOTHY WEI, University of Nebraska - Lincoln — Staphylococci bacteria are recognized as the most frequent cause of biofilm-associated infections. A localized staph infection has the potential to enter the bloodstream and lead to serious infections such as endocarditis, pneumonia, or toxic shock syndrome. Changes in flow conditions, such as shear stress, can lead to stable biofilm growth or the dispersion of portions of the biofilm downstream. Exploration of biofilm physiology indicates a link between production of a specific enzyme called nuclease and biofilm architecture -; however the physical impact of this enzyme in directing the location and behavior of biofilm growth remains unclear. This talk investigates the link between sites of nuclease production and the development of biofilm tower structures using the application of micro-PIV and fluorescently labeled bacterial cells producing nuclease. *Staphylococcus aureus* bacteria were cultured in a BioFlux1000 square microchannel of a 65 by 65 um cross section, and subjected to a steady shear rate of 0.6 dynes. Micro-PIV and nuclease production measurements were taken to quantify the flow over a biofilm tower structure prior and during development. Data were recorded around the structure at a series of two dimensional planes, which when stacked vertically show a two dimensional flow field as a function of tower height.

Timothy Wei
University of Nebraska - Lincoln

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