



# BioSystems Science and Engineering

## SEMINAR

4:00 pm, October 11, 2017  
MRDG Seminar Hall

### A web of streamers: Interplay of hydrodynamics and bacterial biofilm processes

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One of the contentious problems regarding the interaction of low Reynolds number ( $Re \ll 1$ ) fluid flows with bacterial biomass is the formation of filamentous structures called streamers. These streamers are composed of bacterial cells embedded in a self-secreted matrix of extracellular polymeric substances (EPS) and they usually act as precursors to rapid growth and maturation of biomass in closed channels. Understanding and controlling the growth of bacterial streamers, which are inevitable in most aqueous systems, promises to hugely impact biomedical, industrial and environmental applications. Over the last few years, my group has focused on fundamental understanding of bacterial streamer formation and their control using micro-fluidic platforms. In particular, we have discovered that bacterial biomass, in the presence of low Reynolds number flows, can degenerate into filamentous structures governed primarily by the viscoelastic nature of these biological soft materials. Formation of such streamers is an important puzzle in the field and microfluidic devices offer a degree of control previously unavailable to study them.

#### About the Speaker

Dr. Alope Kumar received his Bachelors and Masters degrees from the Indian Institute of Technology, Kharagpur, India in 2005 and his Ph.D in Mechanical Engineering from Purdue University, West Lafayette, USA in 2010. Afterwards he was a Wigner Fellow at Oak Ridge National Labs, Tennessee, USA. Prior to joining IISc in May 2017, Dr. Alope Kumar was the Canada Research Chair in Microfluidics for Biological Systems and Assistant Professor of Mechanical Engineering at the University of Alberta, Canada.

