



Singapore-MIT Alliance for Research and Technology



From Biomolecules to Biofilms

Focused Seminar Series on Biomolecules and Biofilms

11 April — 6 June 2016, Level 5 Seminar Room, Enterprise Wing @ UTown, S'138602

Seminar 5: Exopolymers and Biofilm Morphologies

Dr. Thomas Seviour

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Date: 16 May 2016, Monday

Time: 4pm to 5pm

Venue: Perseverance Room, Enterprise Wing Level 5 @ UTown



Abstract

Diversity in biofilm morphologies has implications for biofilm recalcitrance, predation resistance and instrument clogging. Clinically relevant *Pseudomonas aeruginosa* biofilm morphologies, streamers and microcolonies, were manipulated in situ by magnetic tweezing, with sub pico Newton precision and in extension to simulate natural flow patterns. Streamers were > 4 times more rheologically heterogeneous than microcolonies and displayed the most compliant behaviour ever reported for biofilms of > 10³ m²/N. Their constituents were fractionated using an ionic liquid-based isolation protocol targeting full biofilm solubilisation. eDNA was polydisperse, spanning 200-2000 kDa, and was the dominant network-forming constituent in both streamers and microcolonies, despite both having distinct rheological properties. Morphology differences between streamers and microcolonies were due to the contributions of other exopolymers, in particular the putative polysaccharide Pel which complexes with the eDNA to cage it within microcolonies and restrict rheological heterogeneity. However, only eDNA could self-assemble into networks following solvent transfer into water and this was achieved independent of other exopolymers. Thus, eDNA is the primary biopolymer responsible for streamer formation and interactions between different exopolymers contribute to rheological gradients, which underpin the formation of key biofilm morphotypes.

Biography

Dr Thomas Seviour is a Senior Research Fellow at the Singapore Centre for Environmental Life Sciences (SCELSE) at NTU. He started as an engineering consultant. As a researcher he now strives to deliver new solutions to complex problems, environmental, industrial and medical, through a better understanding of microbial systems, with a particular interest in the processes that take place at biointerfaces such as the extracellular milieu.