

## EXPLORING NOVEL ANTI-BIOFILM TECHNOLOGY USE IN NEW AREAS

### Deepening the interaction between academics and industry

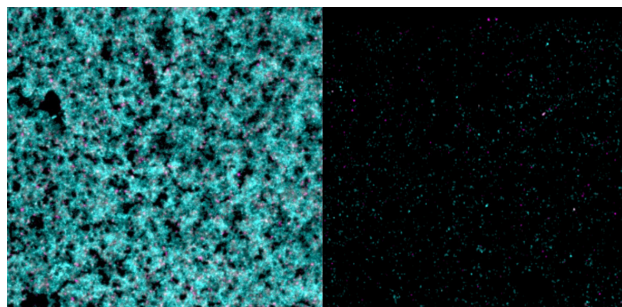
In early 2020 Dr Paolo Pantalone was an NBIC Associate Doctoral Researcher at the University of Nottingham and had been working in association with Unilever on elucidating the mechanism of action of novel agents (Unilever's Lactam Technology) for *Pseudomonas aeruginosa* biofilm prevention.

The opportunity arose via the NBIC FTMA scheme to exploit potential novel applications of the Lactam compounds beyond the Unilever core sectors.

Paolo worked on their use in combination with unique coatings for the prevention of catheter associated urinary tract infections developed at Nottingham. Also called CAUTI's, these cost the NHS £99m per year. According to a House of Commons Select Committee Report, these require an extra 638,000 extra bed days.

Various physical techniques were employed at both Nottingham and in Unilever's Materials Innovation Factory based at Liverpool University. These aimed to characterise the anti-fouling properties of lactam-treated materials using established techniques such as Liquid Chromatography-Mass Spectrometry and confocal microscopy on a state-of-the-art biofilm model. Paolo said,

"The project facilitated development of my current knowledge surrounding the lactam anti-biofilm technology and helped me to translate these agents into a previously unexplored area – applying the lactam material to commercial catheters. This required creative thought and problem solving to deliver insights and areas for opportunities in an efficient manner".



*Left: Untreated silicone (showing biofilm). Right: Lactam treated silicone (showing no biofilm) on catheter sections in Artificial Urine, 48h. S. aureus SH1000 eGFP 24h + P. mirabilis DsRed 24h.*

Paolo's work also allowed his professional network to be enhanced and to work more closely with Unilever development teams and in their facilities. The project allowed Unilever to gain access to skills they required to develop their technology in an area outside of their current fields of use. Unilever recently created a spin-out company (Penrhos Bio Ltd) as a joint venture with the life sciences investment group Innova Partnerships to market the technology outside its normal market sectors. Paolo has now been successful in securing a job with Unilever, demonstrating not just his ability, but also the opportunities offered by collaborative programmes such as the FTMA for researchers to work alongside industry.

Lactams, rather than killing bacteria, prevent micro-organisms from forming biofilms on surfaces by disrupting their communications systems. Through Proof of Concept funding, NBIC has funded other projects to allow Penrhos Bio Ltd to explore and prove, or disprove, other Lactam applications, for example marine antifouling with the Plymouth Marine Laboratory.



### Dr Paolo Pantalone

Dr Paolo Pantalone graduated at the Università degli Studi dell'Aquila, Italy in biotechnologies followed by a MSc in medical biotechnologies completed Cum Laude. During his PhD in molecular microbiology and Post-Doctoral positions at the University of Nottingham, he focused on Quorum Sensing and biofilm inhibition.