

New Materials for Healthcare

Morgan R Alexander

School of Pharmacy

www.nottingham.ac.uk/lbsa

morgan.alexander@nottingham.ac.uk

Biomaterials selection: moving from accessible to bespoke polymers

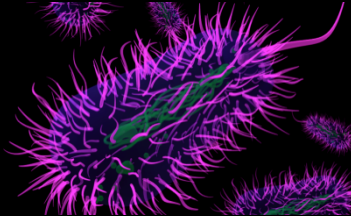
THE VISION

There are better biomaterials out there; if we look, we will find them!

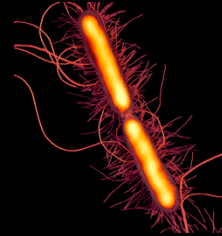
THE REALITY

Where do we look? *The biointerface is incredibly complex!*

HERE'S HOW: Materials Discovery using Micro Arrays



Escherichia coli



Proteus mirabilis



Staphylococcus aureus

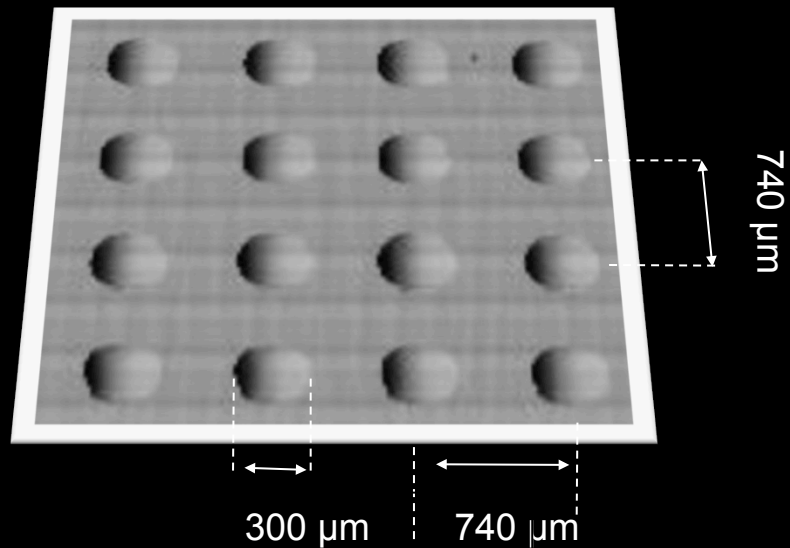
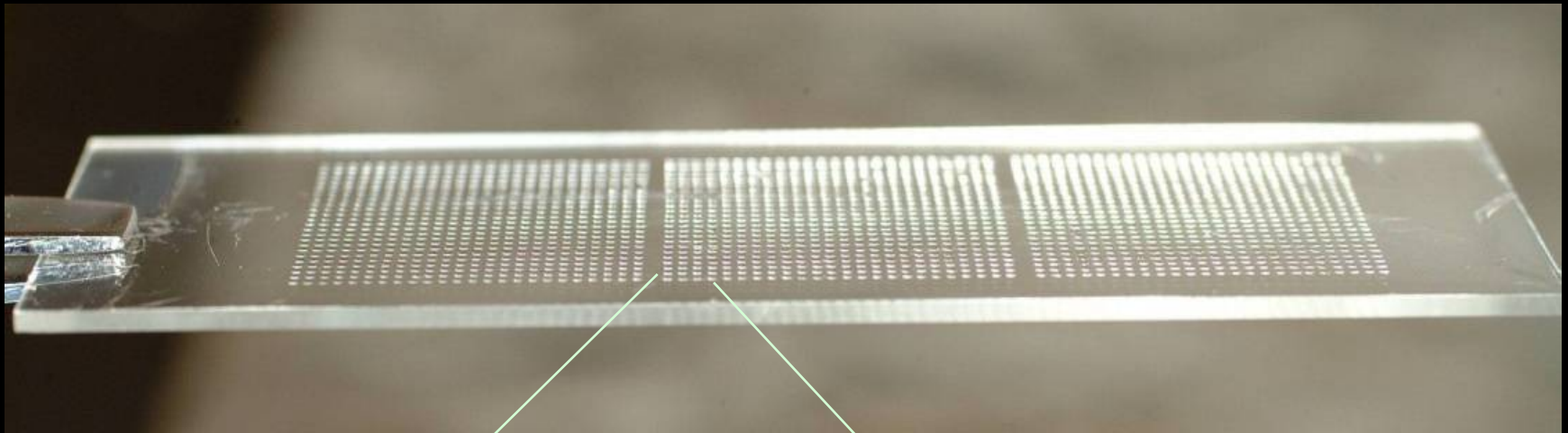


Pseudomonas



wellcome trust

Material Microarray

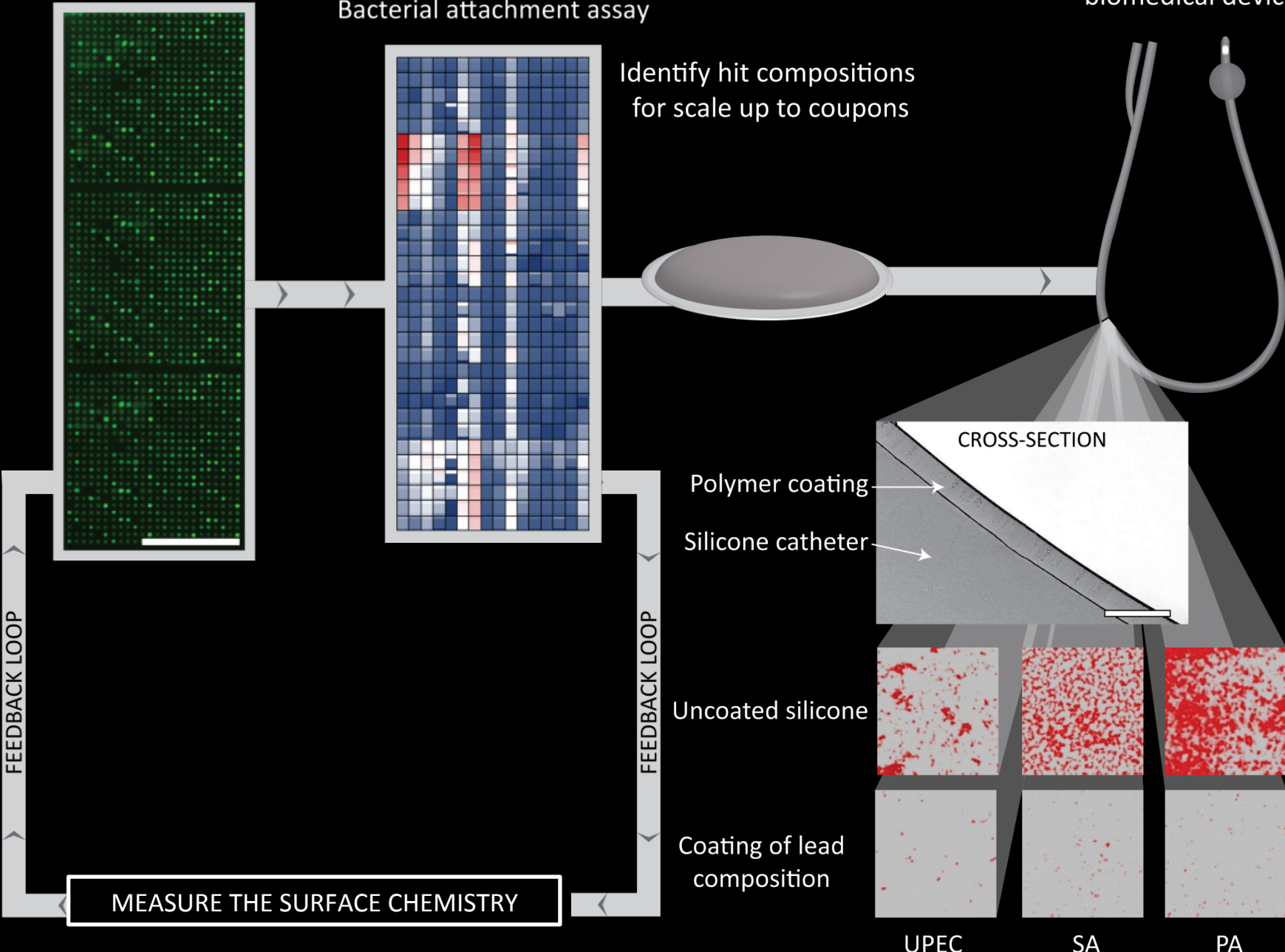


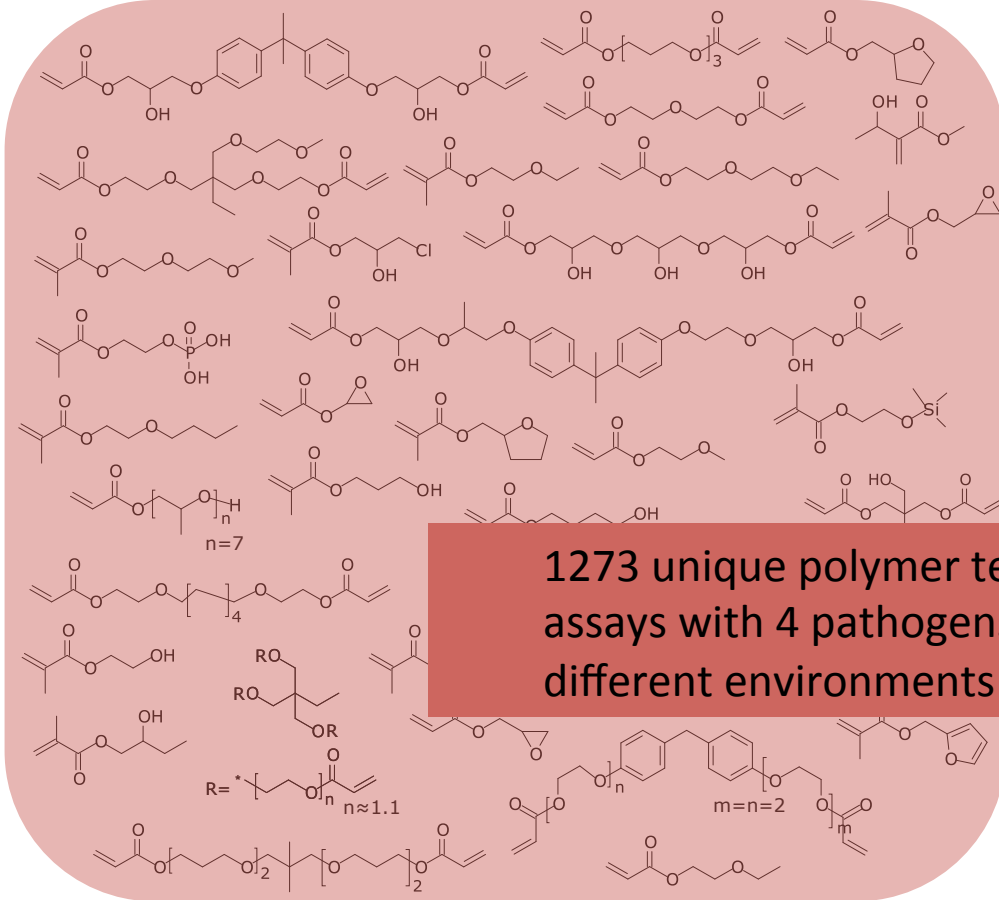
Select monomers of interest
for microarray formation

Bacterial attachment assay

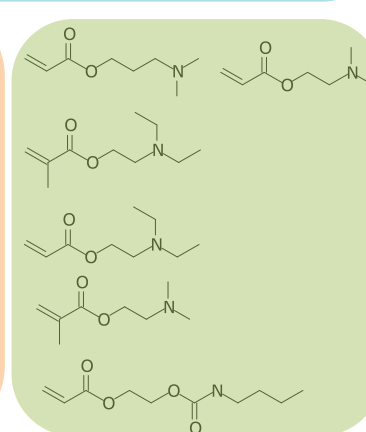
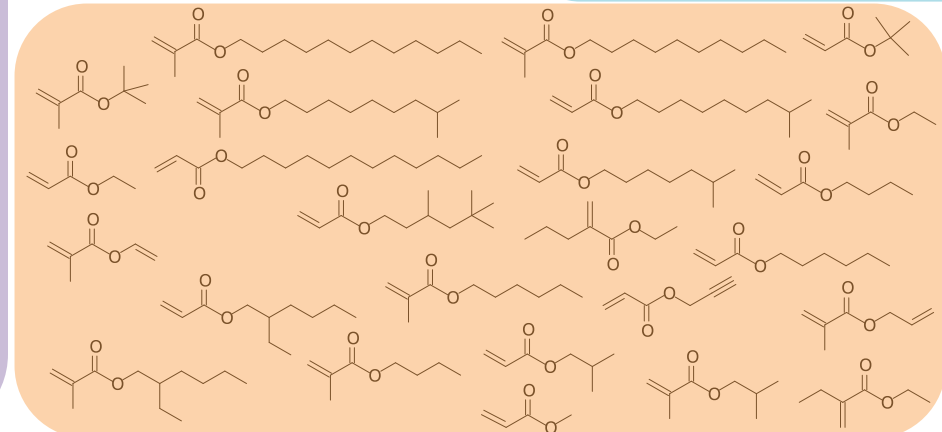
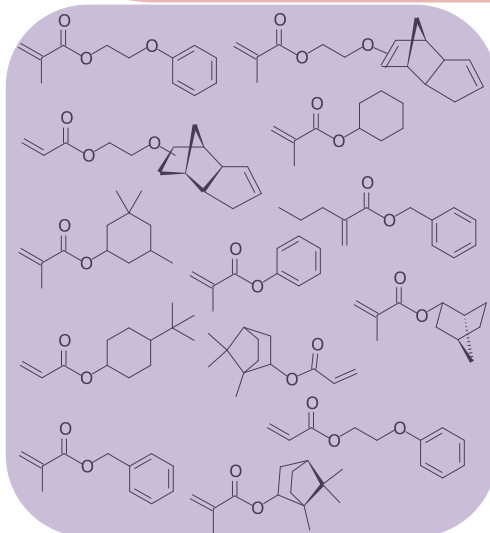
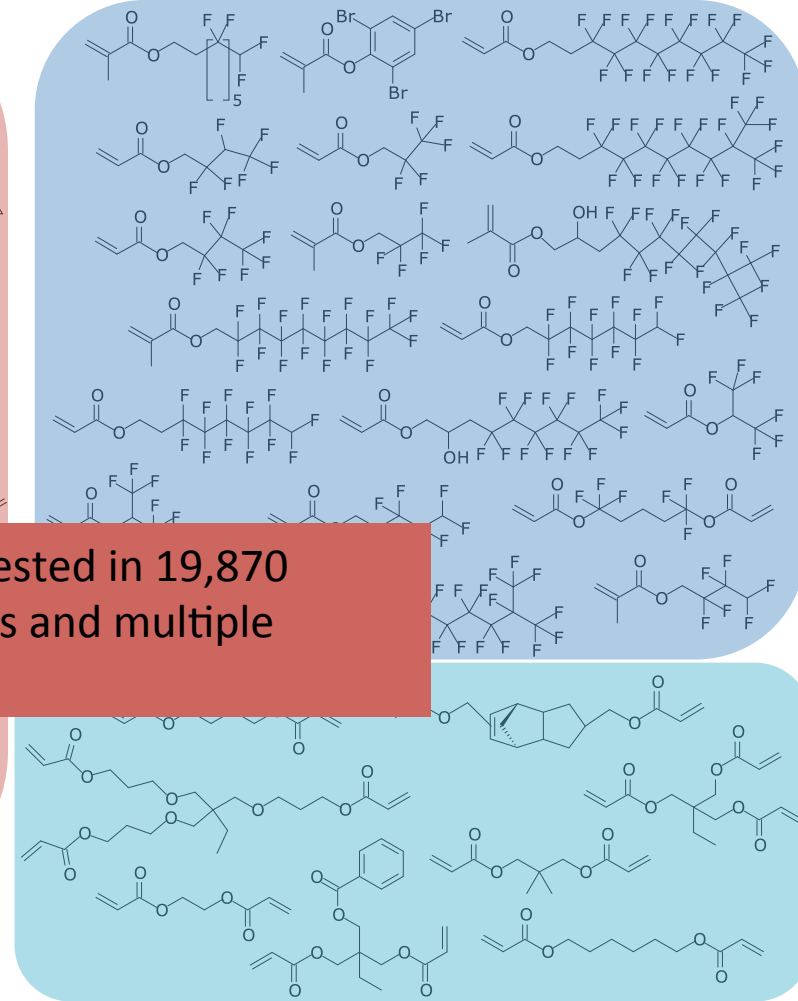
Identify hit compositions
for scale up to coupons

Produce an optimised
biomedical device

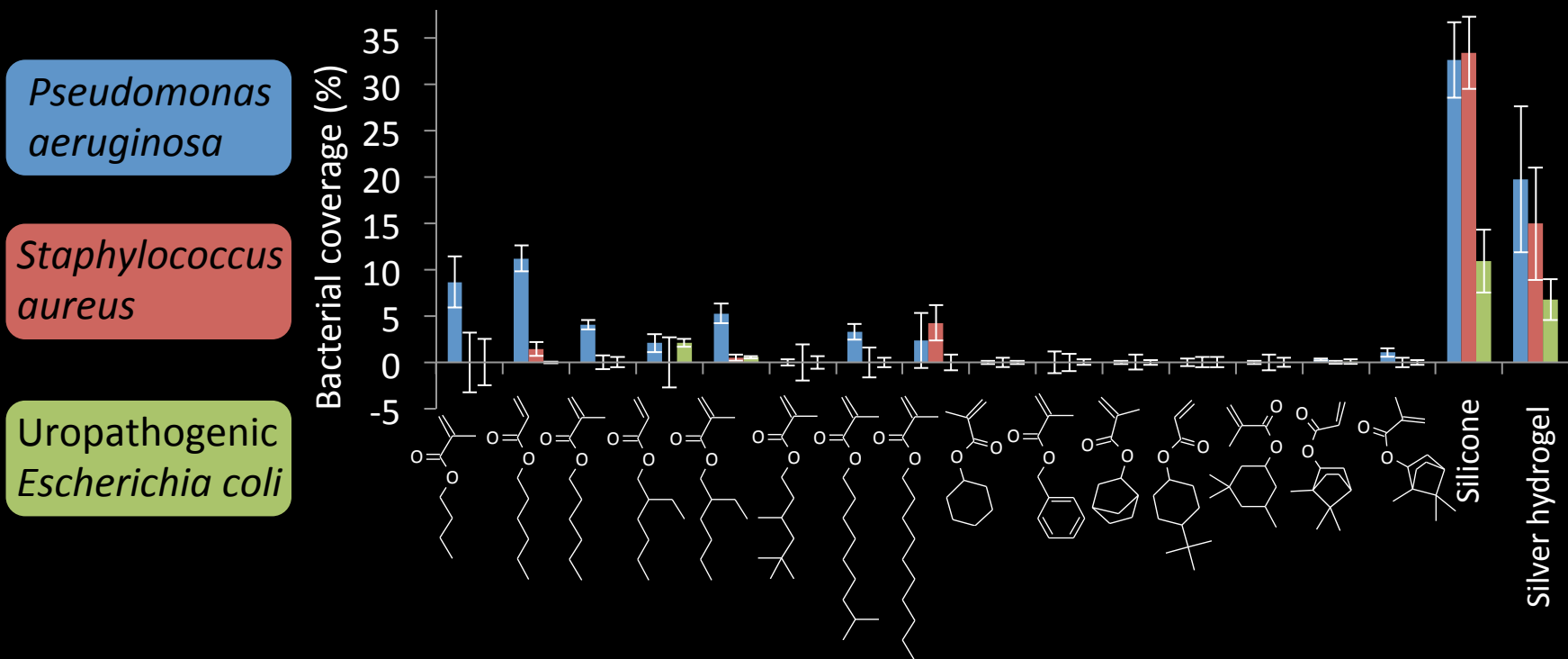
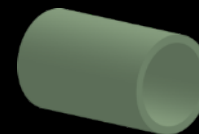




1273 unique polymer tested in 19,870 assays with 4 pathogens and multiple different environments

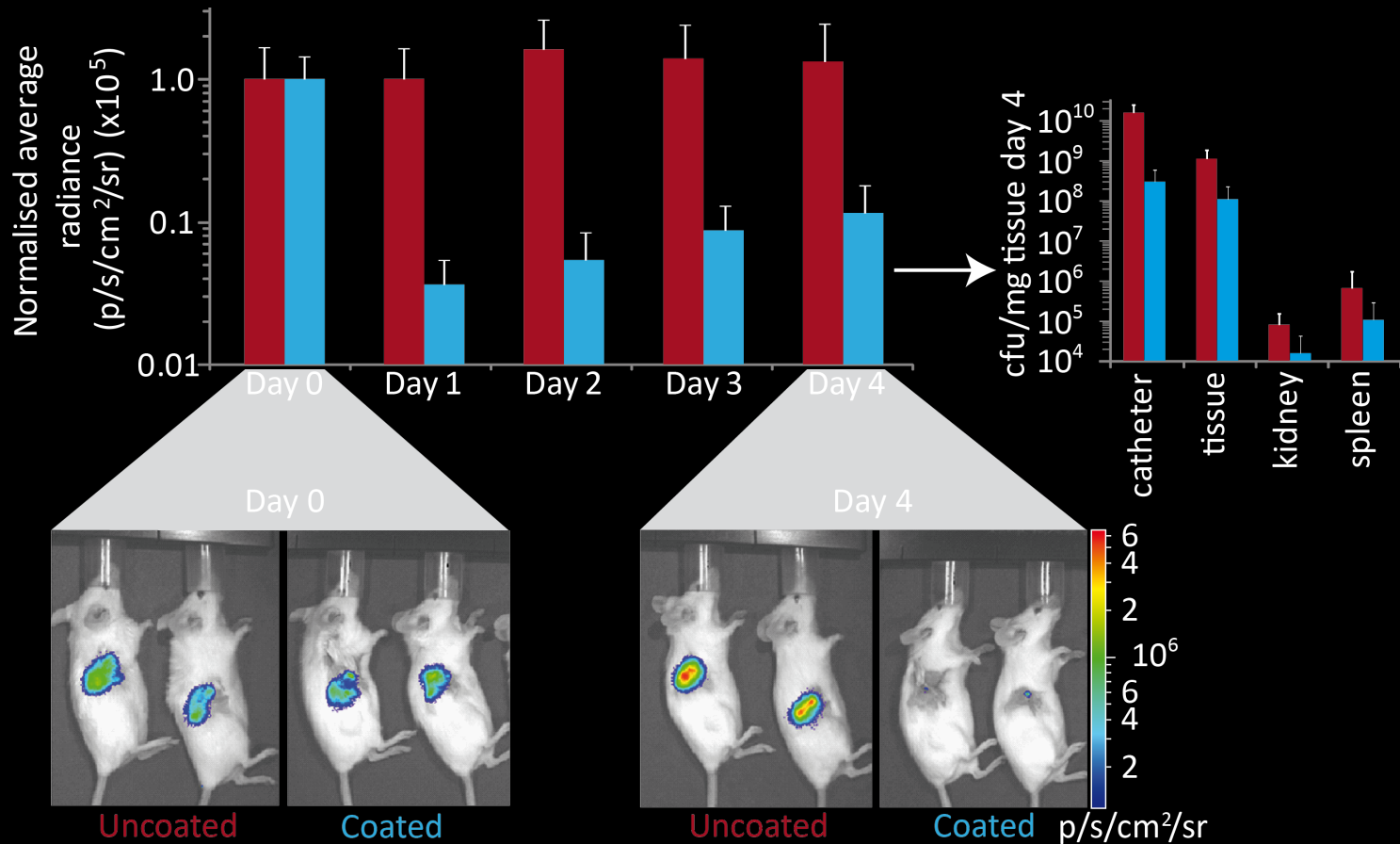


In vitro assessment



Novel polymers which resist bacterial attachment UK
Patent Application no: 1107416.8, 2011.

In vivo studies



Bacterial colonisation resistance retained in complex in vivo foreign body model environment

Off to the clinic...

At an advanced stage with UK SME Camstent, CEO Dave Hampton
CE mark approval process underway in Q1/2 2016



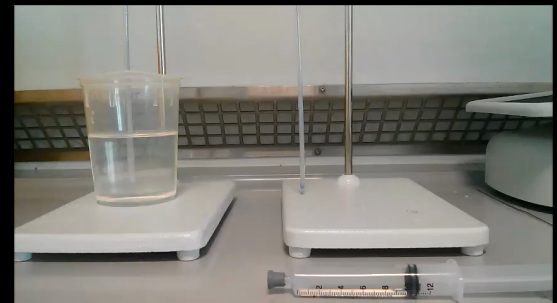
Product Development in collaboration with UK SME Camstent



Revolutions to delamination



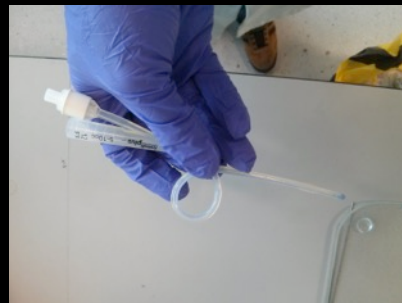
Tack



Balloon inflation and deflation (wet)



Post test coating integrity



Flexure testing



Simulated used testing-insertion
force testing using anatomical model

Summary

- A new class of bacterial resistant materials have been discovered by micro array screening
- These are being taken to the clinic in collaboration with Camstent Ltd.
- The materials discover method is being applied to a range of other areas, including (most without commercial partners):-
 - Polymers with pro and anti inflammatory immune response
 - Polymers to reduce infection rates for endotracheal tubes
 - Polymers to reduce infection rates in external fixtures
 - Polymers to reduce infection rates with venous catheters
 - Polymers to reduce fouling of domestic heat exchangers