University of Birmingham Business Club

Breakfast Briefing

‘Innovative surface coatings and food hygiene’

Tuesday 10 October 2017

Business with Birmingham

EPSRC

Engineering and Physical Sciences Research Council

UNIVERSITY OF BIRMINGHAM

Innovative Surface Coatings & Hygiene

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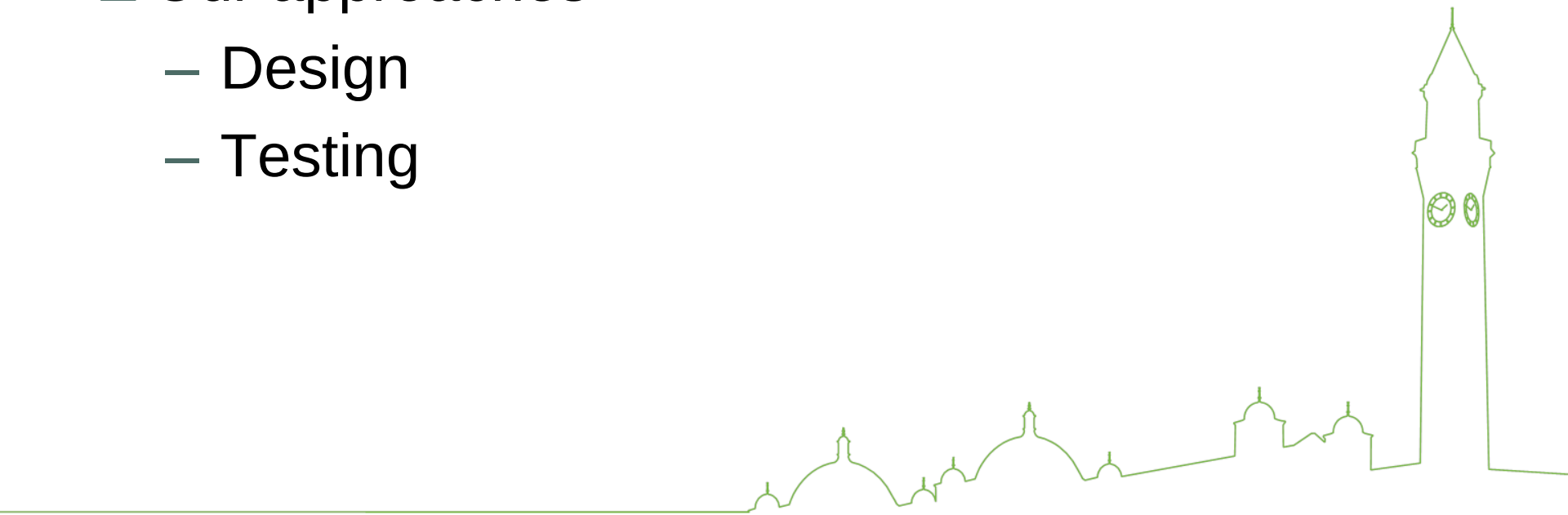
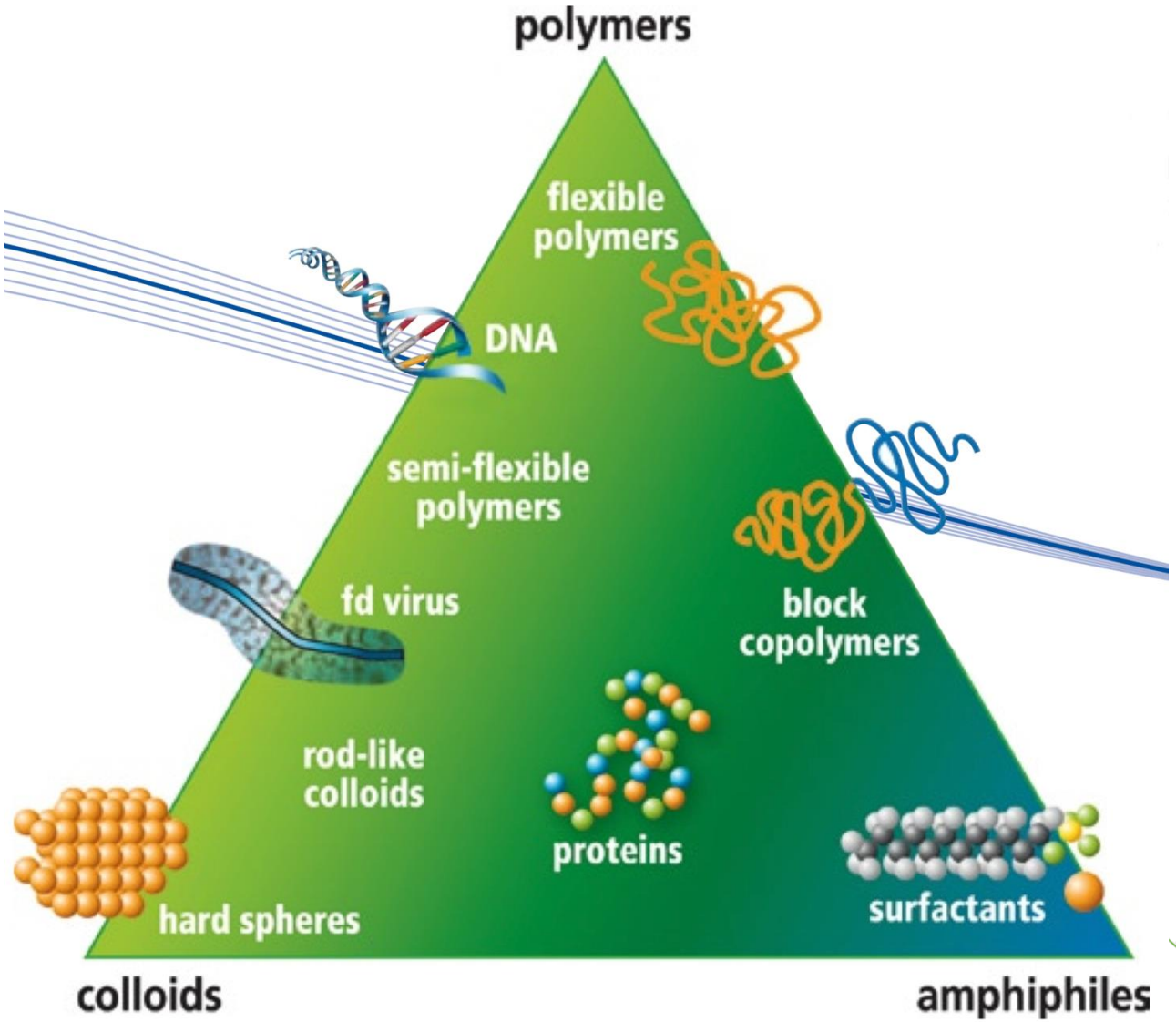
Outline

- Overview
- Surface coating strategies
- Antimicrobial surface coating
- Our approaches
  - Design
  - Testing

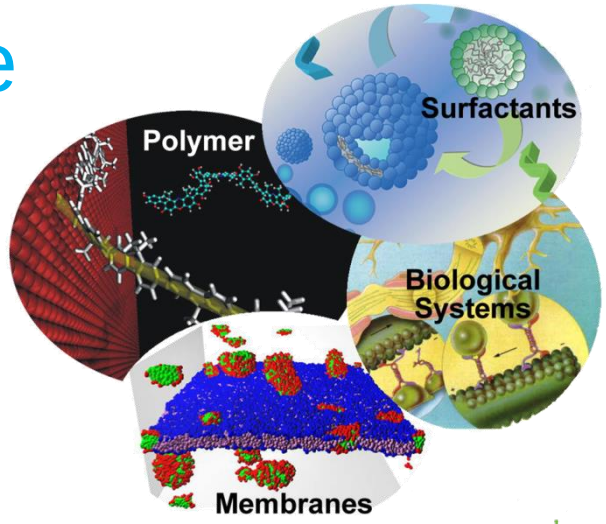


What I am interested



Why am I interested in

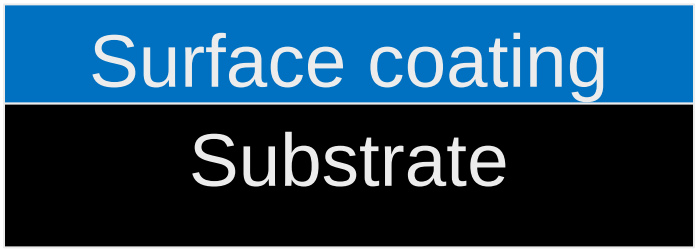
Soft matter at surface/interface



- Surface functionalization / coating
- Colloidal stabilization
- Lubrication
- Detergents
- Fouling/Cleaning

- Biomaterials
- Drug delivery
- Cell mechanics
- etc.

Surface coating strategies



Surface

Coating

Interface

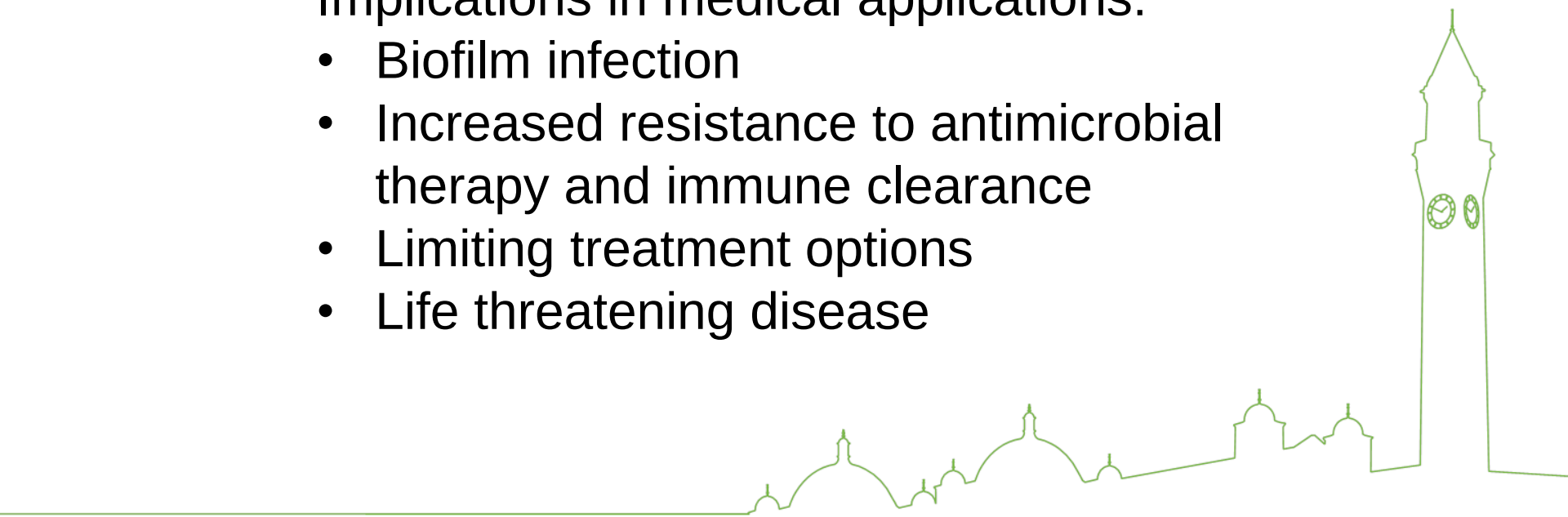
- Vapour deposition
- Chemical & electrochemical route
- Spraying
- Roller coating
- Physical coating

Antimicrobial surface coating

- Medical device
- Consumer goods
- Food packaging

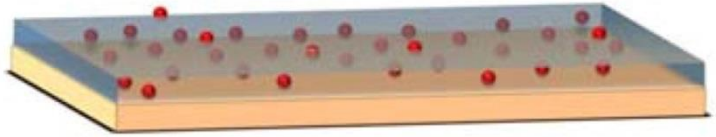
Implications in medical applications:

- Biofilm infection
- Increased resistance to antimicrobial therapy and immune clearance
- Limiting treatment options
- Life threatening disease

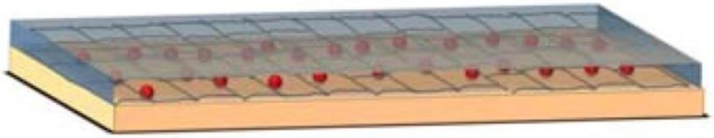


Development - concept

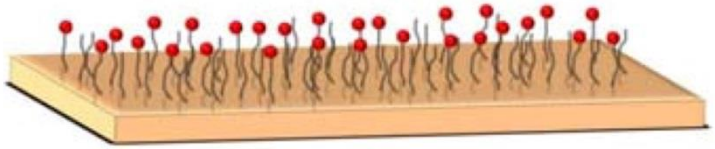
Surface immobilized antimicrobials



Antimicrobial releasing surface coating



Hydrogel contained antimicrobials

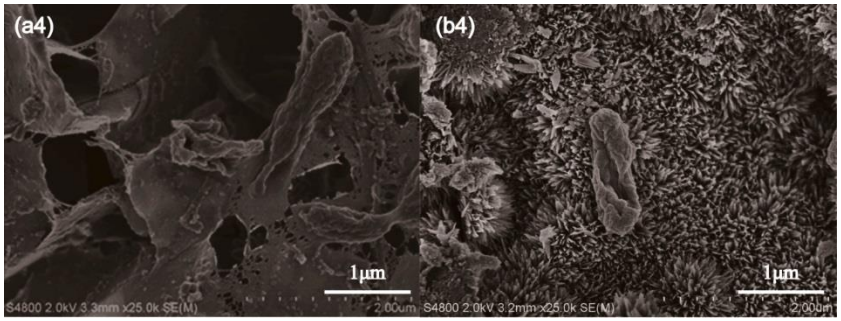


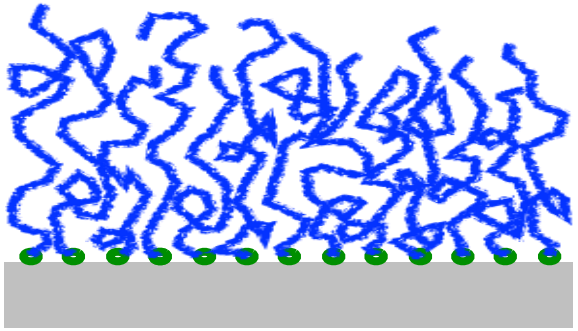
Surface tethered antimicrobials

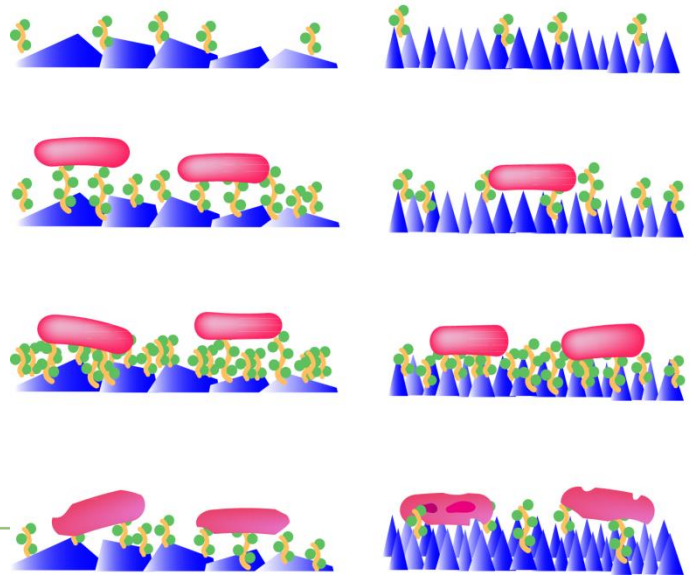
- Two major strategies
  - Anti-adhesive: polymer, hydrogel, superhydrophobic
  - Bactericide: antimicrobial peptides, antibiotics, chitosan, e
- Multi-functional coating
- Application dependent
- Expectation

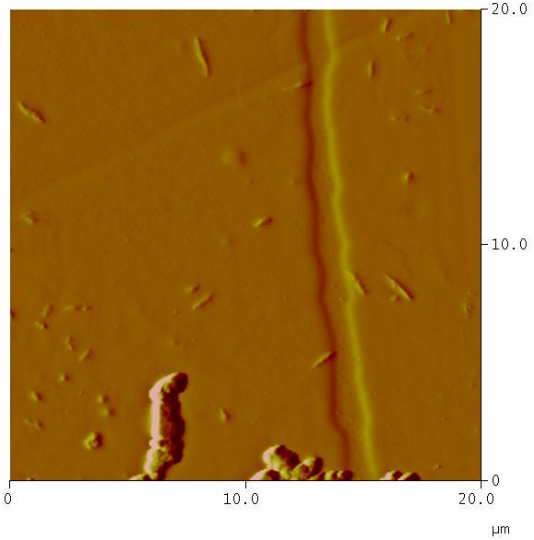
Surface modification – chemical routes

- Polyelectrolyte layer
- Inorganic film



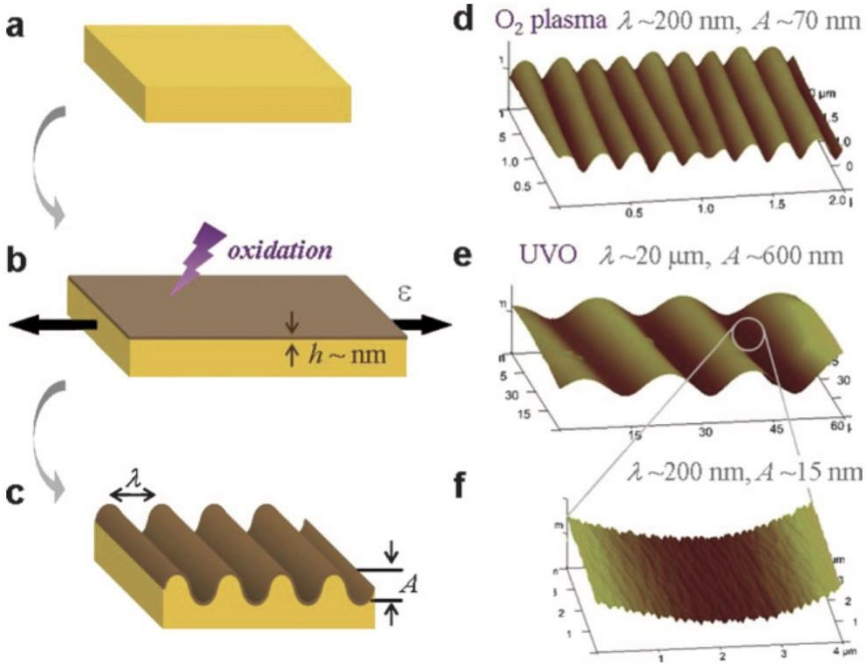


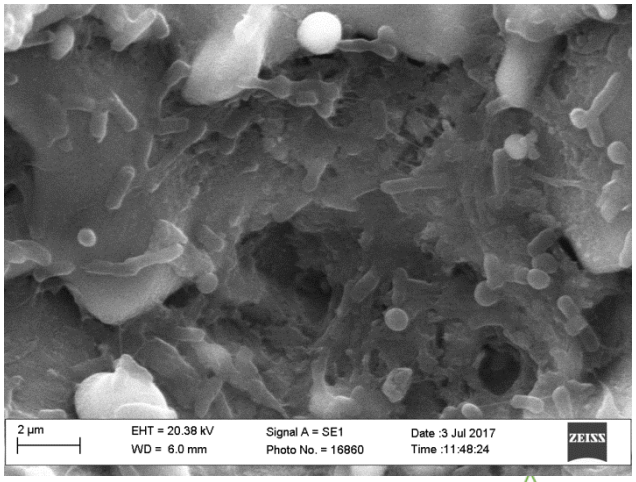


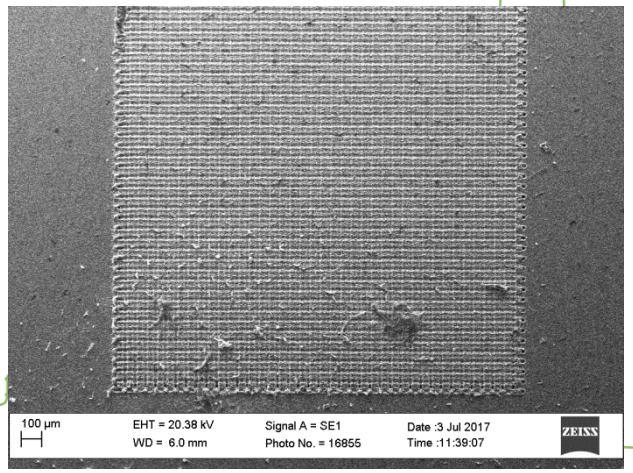


Surface modification – physical routes

- Organic film
- Precision machining



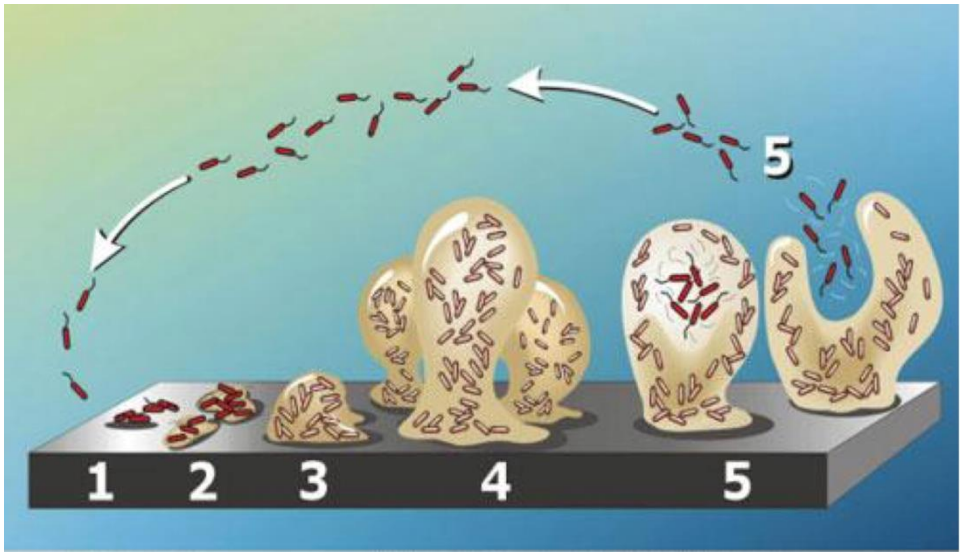


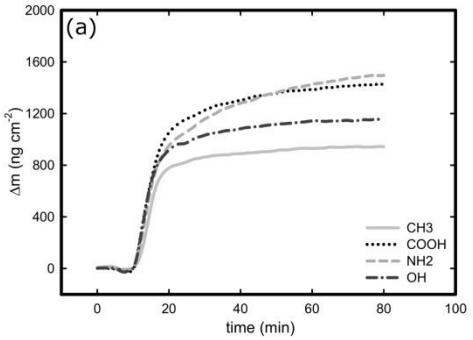


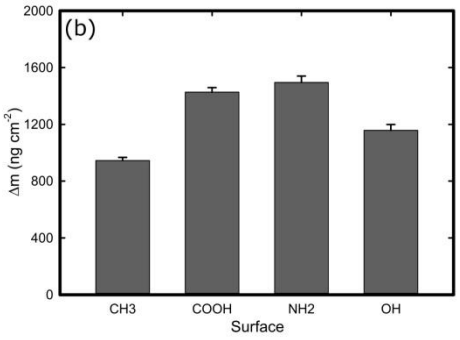
Testing – initial stage

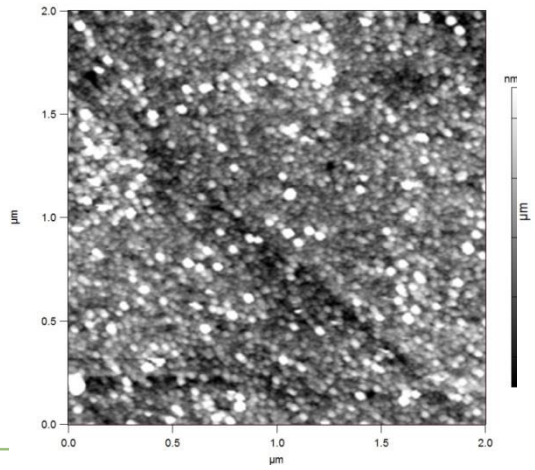
Protein adsorption

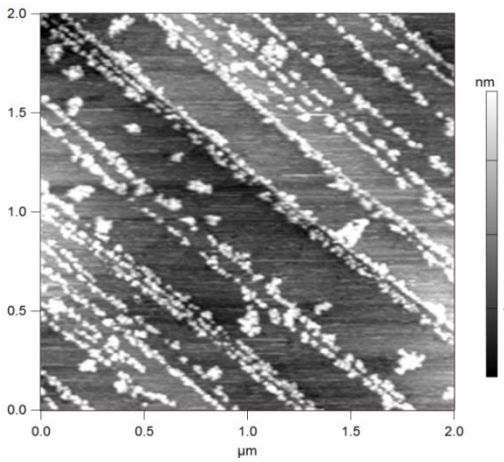
- Adsorption kinetics
- Adsorption amount
- Distribution on surfaces
- Response to environment
- Removal force required

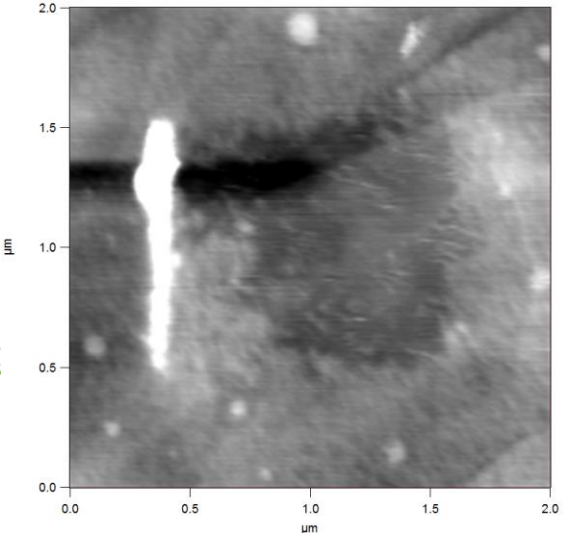






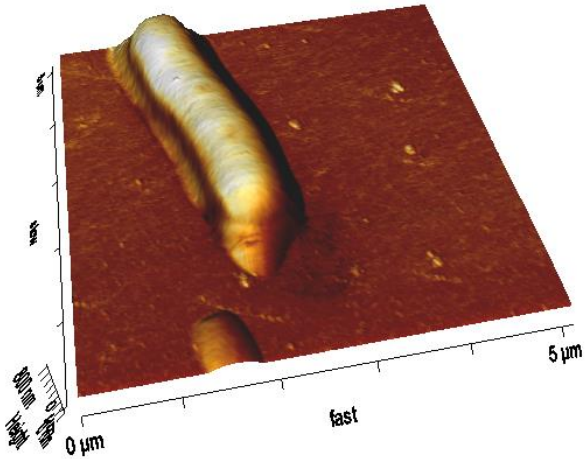


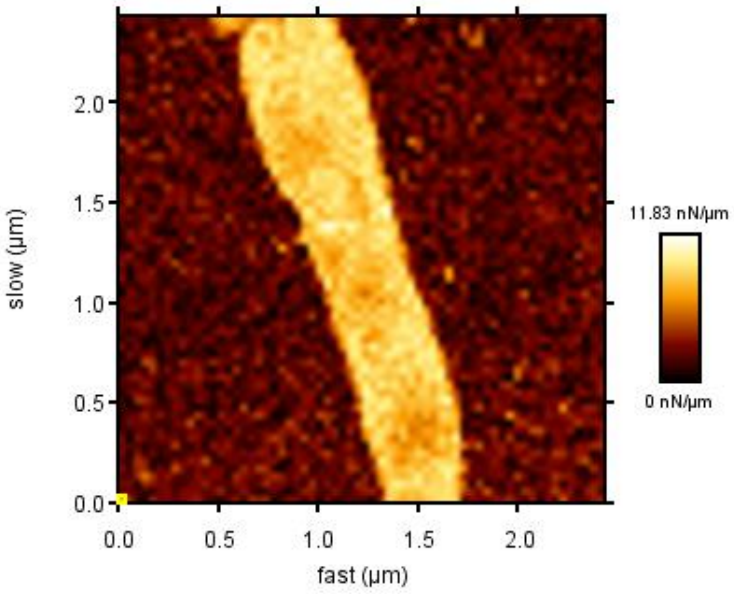




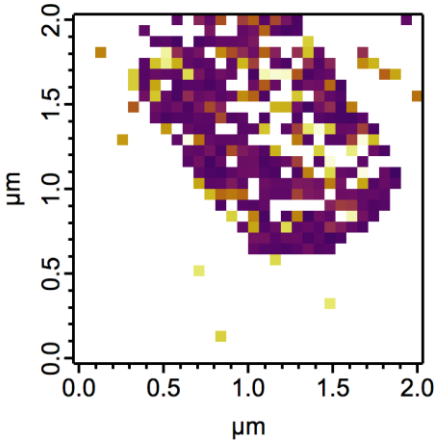
Testing – individual cell

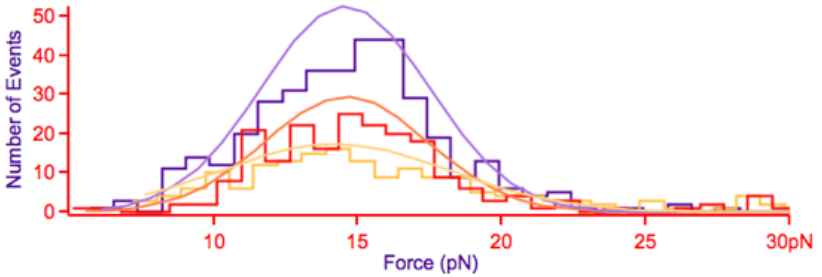
Escherichia coli





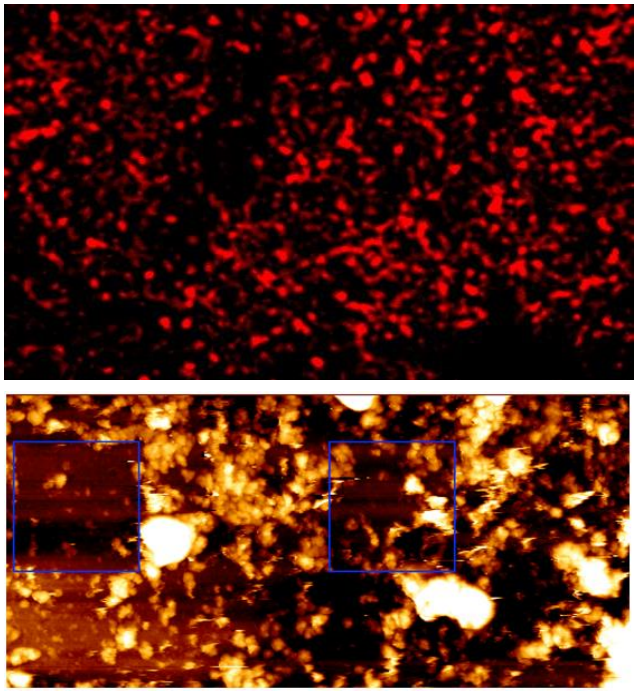
Pseudomonas putida



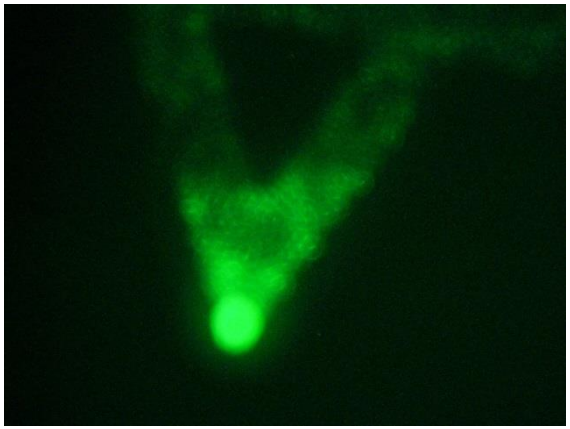


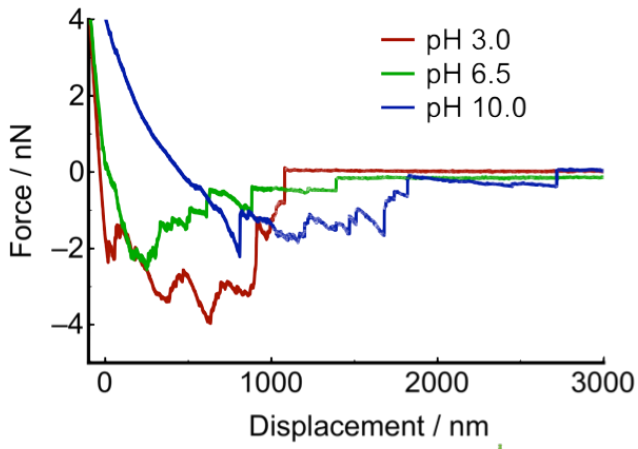
Testing - biofilm

Enterococcus faecalis



Rhodococcus sp.





Thank you!

And now
Pitches

Business *with* Birmingham

Dr Felicity de Cogan

Royal Academy of Engineering Enterprise Fellowship

Institute of Microbiology and Infection

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NitroPep

ROYAL ACADEMY OF ENGINEERING

UNIVERSITY OF BIRMINGHAM

METALTECH

NitroPep

The Problem

*What is growing on the surfaces **you** touch everyday?*

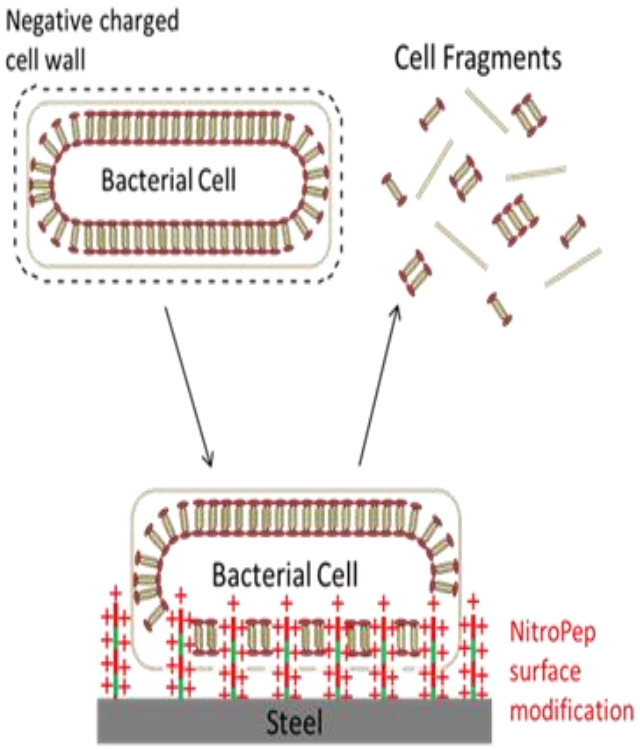
Micrococcus

MRSA

Pseudomonas aeruginosa

NitroPep

The Solution



- Durable, non-toxic and efficacious.
- Significantly reduces bacteria number in laboratory tests.
- Greater than 99 % effective in trials with potential customers

NitroPep

Trials

Queen Elizabeth Hospital Trial – NitroPep surface modification showed greater than 99 % efficacy

NitroPep

What We Need!

Innovative companies who are looking for disruptive technologies in the market

Sales representatives with expertise in the healthcare market, especially the NHS.

NitroPep

How to get in touch

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NitroPep

Next…

Business *with* Birmingham

Firm performance and wage setting

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CITY REDI

Business with Birmingham

Firm performance and wage setting

Funded by the **Joseph Rowntree Foundation** ***City-REDI*** *is* investigating the ***hospitality***, ***retail*** and ***manufacturing*** sectors with regard to the following:

- What metrics do you use to measure firm performance?
- What approaches are you using to increase productivity?
- What factors do you consider when setting wages?
- (How) do workers gain from productivity increases?

- ❑ *Up to an hour* of your time for a discussion
- ❑ **Confidentiality and anonymity guaranteed**

What this is for –

Research to inform and influence policy

CITY REDI

Business with Birmingham

Next…

Business *with* Birmingham

A.T.E.T.A
Opportunities - Future Energy Systems

David Terry
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European Union
European Regional
Development Fund

Business with Birmingham

ATETA

What we do

Business support for energy technology companies and energy users

What we need

- Free service to all SME businesses in Birmingham, Bromsgrove, Cannock Chase, East Staffordshire, Lichfield, Redditch, Solihull Tamworth and Wyre Forest

What we offer

Multi disciplinary team – smart grid and electrical systems, thermal energy material and storage, bio-energy generation

Our USP

Take advantage of opportunities in a changing energy market place. Access expertise and facilities in a World leading Energy institute

ENERGY CAPITAL

ENERGY RESEARCH ACCELERATOR

At the forefront of energy transformation

CATAPULT Energy Systems

European Union
European Regional Development Fund

Get in touch…

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European Union
European Regional Development Fund

Thank you to our speakers and for your attention

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Pioneering research and skills

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