

Polymers for binding or repelling bacteria

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This range of novel synthetic polymers control bacterial attachment, resulting in specific sequestration or repulsion of bacteria such as Salmonella and E. coli.

It is well understood that bacterial cell density, surface charge, and the presence of various microbially produced compounds, such as exopolysaccharides, are crucial in the process of cellular adhesion. However, physicochemical features, such as pH, temperature, composition of growth media and surface conditioning factors, also affect surface attachment.

Researchers at the University of Edinburgh have used a polymer-based microarray platform to identify novel materials which bind or not to the major food-borne pathogenic bacterium *Salmonella enterica serovar typhimurium* (S. Typhimurium - strain SL1344), which is of global clinical and veterinary importance, and to the commensal bacterium *Escherichia coli* (E. coli - strain W3110). This resulted in a range of novel polymers that can selectively bind or repel these different bacterial strains, which provides for a multitude of downstream applications.

Key Benefits

- Polymers identified which are selective for different bacterial species
- Species selective polymers with either adherent or repellent properties
- Polymer synthesis is cost effective, straightforward and scalable
- The polymers can be easily manufactured to GMP conditions
- Approach applicable for other bacteria, including *Clostridium difficile*

Potential Applications

- Rapid isolation of hospital pathogens
- Capture of bacteria, spores or viruses on cleaning materials used in clinical, industrial or domestic environments
- Selective reduction of pathogen loads via animal feeds
- Minimisation of surface contamination on medical devices (e.g. surgical implants and orthodontic devices)
- Repellent packaging for food preparation

Key Publications

- Perngallo *et al.* (2011) Colonising new frontiers—microarrays reveal biofilm modulating polymers. *J. Mater. Chem.*, 21, 96-101. <http://pubs.rsc.org/en/Content/ArticleLanding/2011/JM/c0jm01987a>
- Venkateswaran *et al.* (2014) Bacteria repelling poly(methylmethacrylate-co-dimethylacrylamide) coatings for biomedical devices. *J Mater. Chem. B. Mater. Biol. Med.*, 2(39):6723-6729. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4247239/>

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The patent publication document, detailing invention, methods and results, will be provided following acceptance of the University's Open Technology standard terms and conditions.