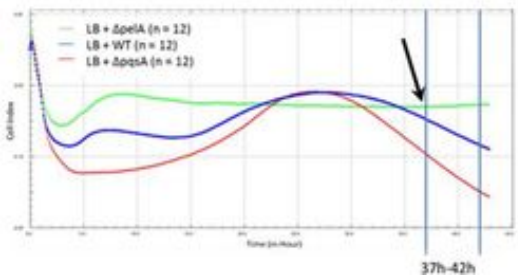
Technology Offer

Determination of Biofilm Dynamics via Impedance

Reference Number 02-00328

Challenge

The formation of bacterial biofilms poses big challenges not only for antibiotic resistance, but also for implants and sterilizing surfaces. Due to the high level of bacterial adaptation, biofilms can affect a broad array of surfaces associated with liquids like industrial pipes or basins, causing clogging and corrosion at critical sites. Biofilms formed within the human body enable pathogens to display a different array of coping strategies and may increase their resistance to drug therapies a thousand-fold. For the analysis of biofilms, different methods are available, which are time-consuming and - like crystal violet staining - suffer from a high standard deviation. In addition, no reliable method is established allowing the analysis of the dynamics of biofilm formation.



Representation of the PA14 biofilm growth with impedance spectroscopy (96 XCELLIGENCE sample plate 43h; LB growth medium). P.a.wild-type and ?pqsA are biofilm formers, ?pelA does not form biofilm

Technology

The invention discloses the use of impedance analysis to rapidly and accurately measure biofilm development over time. Impedance analysis has already been applied successfully in eukaryotic cytometry as a label-free means for the measurement of the development of cell layers of adherent cells. By measuring the dielectric behaviour of a bacterial biofilm while varying the frequency, the inventive technology provides now a means to determine the growth rate of prokaryotic biofilms very precisely with only little standard deviation. Impedance analysis is particularly useful for pellicle biofilms not attached to the bottom of the culture vessel, such biofilms are built up by a number of relevant pathogens such as different *Pseudomonas* species. The technology can be used to analyse multiple samples in a short time and requires small sample volumes. This opens up the opportunity for further miniaturization and thereby the development of a micro-chip based diagnostic tool or a high-throughput-assay system for drug research and the stratification of clinical isolates.

Commercial Opportunity

The invention is offered for licensing and co-development.

Development Status

The technology was developed using the xCELLigence® RTCA with CIM-Plates and E-plates for the analysis of *Pseudomonas* biofilm formation. Other formats and pathogens are under investigation.

Patent Situation

International PCT-application pending (WO2016097316).European and US patent application pending.

Further Reading

van Duuren et al. 2017. Use of Single-Frequency Impedance Spectroscopy to Characterize the Growth Dynamics of Biofilm Formation in Pseudomonas aeruginosa. Scientific Reports 7: 5223. DOI:10.1038/s41598-017-05273-5.

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