Teclis Scientific

Measuring instruments and Services for Interface Science

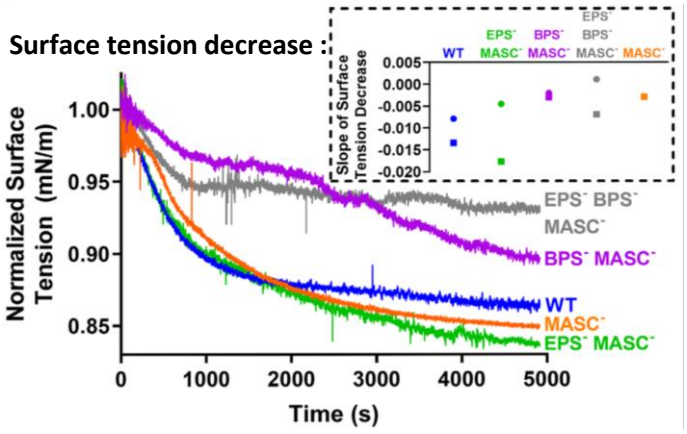
Science

Modulation of bacterial multicellularity via spatio-specific polysaccharide secretion

Abstract: The development of multicellularity is a key evolutionary transition allowing for differentiation of physiological functions across a cell population that confers survival benefits; among unicellular bacteria, this can lead to complex developmental behaviors and the formation of higher-order community structures.

Herein, we demonstrate that in the social δ-proteobacterium Myxococcus Xanthus, **the secretion of a novel biosurfactant polysaccharide (BPS) is spatially modulated within communities**, mediating swarm migration as well as the formation of multicellular swarm biofilms and fruiting bodies**.** BPS is a type IV pilus (T4P)-inhibited acidic polymer built of randomly acetylated β-linked tetrasaccharide repeats. Both BPS and exopolysaccharide (EPS) are produced by dedicated Wzx/Wzy-dependent polysaccharide-assembly pathways distinct from that responsible for spore-coat assembly. While EPS is preferentially produced at the lower-density swarm periphery, BPS production is favored in the higher-density swarm interior; this is consistent with the former being known to stimulate T4P retraction needed for community expansion and a function for the latter in promoting initial cell dispersal.

Together, these data reveal the central role of secreted polysaccharides in the intricate behaviors coordinating bacterial multicellularity.



https://doi.org/10.1371/journal.pbio.3000728

Discover more

www.teclis-scientific.com

Product

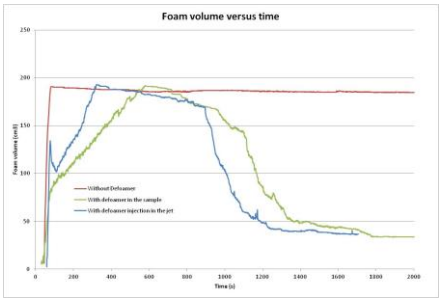
MINIJET™: Screening Anti-Foam agents

FOAMSCAN MINIJET™ has been specially designed to measure the ability of antifoam agents:

- their effectiveness and efficiency to collapse foams,
- their persistence to maintain their effect with time.

Foam is generated by the liquid-jet recirculation of a sample in a glass measuring tube. The defoamer is injected manually or automatically by the defoamer system at any time of the experiment. Foam volume vs time is measured by image analysis. It determines the **effectiveness, efficiency and persistence of antifoam agents**.

3 examples of characterizing anti-foam agents with MINIJET™



Measurement conditions:

- Flow rate of the liquid jet: 645 ml/min,
- Sample volume: 100 ml,
- Room temperature
- Liquid jet stops when foam volume reaches 190cm3

EX1 sample without defoamer
EX2 antifoam is added in the liquid sample
EX3 antifoam is added directly inside the liquid jet

✉ contact@teclis-scientific.com

Application Note

How to determine the surface exclusion pressure of a molecule

Tracker™ determines the exclusion pressure of a protein which is an indicator of its ability to penetrate an interface. Interfaces of the same chemical composition but of different surface concentrations are measured with the Tracker™. The additional decrease of surface tension induced by the protein is an evidence of its incorporation into the interface.

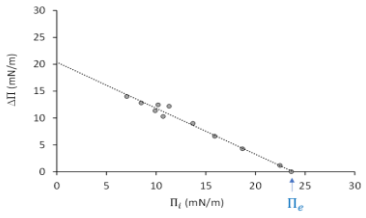


Figure 2 : surface pressure increment ΔΠ as function of the initial surface pressure Πi

Above a critical value of surface pressure Π_i , corresponding to the exclusion surface pressure Π_e , this adsorption is no longer possible and no further lowering of surface tension is observed ($\Delta\Pi=0$).

✉ contact@teclis-scientific.com