Characterising cleaning relevant properties of native model biofilms for efficient biofilm removal strategies

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Objective

Because of their increased resistance against chemical, environmental and mechanical forces, biofilms represent a frequent source of contamination in the food industry. Thus, developing reliable cleaning strategies to control and remove biofilms is crucial. For that it is important to understand the relevant influences on the biofilm as well as their behaviour during growth and removal. This study aims to target this problem by characterising structural biofilm properties and to evaluate methods in regard to cleaning relevant properties in the frame of the Project Biomitate.

Methods

Microbacterium lacticum D84 (M. lacticum) was incubated in small petri dishes (Ø35mm) with milk broth for 12 days at 30 °C to grow a native biofilm model. After cultivation, the biofilm was analysed in regard to rheological and textural parameters.

Results

Rheological parameters, especially the young's modulus and the loss and storage modulus, provide essential information about the viscoelastic properties of the biofilm. A high young's modulus indicates a stiff substance, where more force is needed to disrupt a biofilm, which is correlating with cleaning relevant properties. With additional microscopic evaluation, qualitative data and the distribution of EPS components is visualised.

Conclusion

With the obtained parameters, information about cleaning relevant properties of M. lacticum biofilms is gained. Enhanced knowledge in this area can help improve cleaning procedures and optimize operational parameters. Further, the results of this study can be used to create a microorganism free biofilm imitate with correlating properties that can be applied for cleaning validation processes in the industry.

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