

Preparation of *Komagataeibacter xylinus* inoculum for bacterial cellulose biosynthesis using magnetically assisted external-loop airlift bioreactor

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April 10, 2021

Abstract

The aim of this study was to demonstrate the applicability of a novel magnetically-assisted external-loop airlift bioreactor (EL-ALB), equipped with RMF generators for the preparation of *Komagataeibacter xylinus* inoculum during three-cycle repeated fed-batch cultures, further used for bacterial cellulose (BC) production. The fermentation carried out in the RMF-assisted EL-ALB allowed to obtain an inoculum of more than 200x higher cellular density compared to classical methods of inoculum preparation. The inoculum obtained in the RMF-assisted EL-ALB was characterized by a high and stable metabolic activity during repeated batch fermentation process. The application of the RMF-assisted EL-ALB for *K. xylinus* inoculum production did not induce the formation of cellulose-deficient mutants. It was also confirmed that the ability of *K. xylinus* to produce BC was at the same level (7.26 g/L of dry mass), regardless of inoculum age. Additionally, the BC obtained from the inoculum produced in the RMF-assisted EL-ALB was characterized by reproducible mechanical strength, nanostructure and total crystallinity index. The results obtained in this study may find multiple applications in any biotechnological processes requiring a high-quality bacterial inoculum.

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