

Bacterial cellulose production on whey medium

Bacterial cellulose (BC) is a biopolymer with a potentially high added value, produced by certain acetic acid bacteria (AAB) strains. Due to its great biodegradability and mechanical properties, BC has a wide range of potential applications in such fields as food industry, biomedicine, packaging, electronics et al. Up to date industrial-scale BC production still is mostly unsuccessful. In general, costs of growing media can reach up to third part of total production costs. Research shows that different kind of industrial and agricultural by-products can be used to decrease growth media costs. In milk industry only 10 – 20 % of total milk is converted into an end-product, other 80 – 90 % is the liquid fraction known as whey – a problematic by-product that may cause severe environmental pollution when utilised improperly. In the current study whey was evaluated as an alternative BC synthesis medium. It was shown that as compared with other strains of AAB, *Komagataeibacter rhaeticus* P-1463 showed highest production of BC (1.95 ± 0.15 dry BC weight) on unmodified whey. However, BC synthesis on whey was significantly lower than on the standard Hestrin & Schramm media (3.26 ± 0.05 g/L). Although it was shown that *K. rhaeticus* P-1463 can utilise both lactose (0.26 ± 0.03 g/L) and galactose (0.28 ± 0.02 g/L) as the main C source in modified HS medium, where glucose is replaced, respectively. It has been shown, that decreased whey concentration resulted in lower BC synthesis. Whey hydrolytic pre-treatment was evaluated and increased BC synthesis by enzymatic hydrolysis was (2.41 ± 0.04 g/L) was shown. Limiting factors were studied and no specific impact was found on BC synthesis, thereby showing that lactose is the carbon source being difficultly assimilable for AAB, and its consumption for BC synthesis is little or no affected by the presence of added growth factors. Therefore, further research for optimisation of whey medium for BC production is required.

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