# Document details





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## Isolation and identification of bacteria-producing cellulose from tropical fruit for halal capsule application (Article)

Awang, N.A.[a], Amid, A.[b], Maifiah, M.H.M.[b], Jimat, D.N.[a]

[a]Department of Biotechnology Engineering, Kulliyyah of Engineering, International Islamic University Malaysia (IIUM), Jalan Gombak, Kuala Lumpur, 53100, Malaysia
[b]International Institute for Halal Research and Training (INHART), International Islamic University. Malaysia (IIUM), Level 3, KICT Building, Jalan Gombak, Kuala Lumpur, 53100, Malaysia

### Abstract

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Bacterial cellulose (BC) is pure cellulose synthesized by various species of bacteria. Raising demands on bacterial cellulose is due to its pure and simpler structure. It has plenty of applications in various industries such as food, medical and cosmetics, rendering it a choice in halal industry application as a substitute for non-halal gelatine. However, challenges arise during the BC production such as high production cost and low volumetric yield. In this study, BC is studied to overcome the barriers to BC production. Isolation and identification of cellulose producing bacteria were carried out on eight different tropical fruit sources using Hestrin-Schramm media in static culture condition. Morphological and molecular identification by microscopic observation, gram staining, and 16S rRNA analysis were conducted to identify the characteristics and strain of the new isolates. Next, the selected colonies were challenged to grow in agitating condition using modified HS media. The effects of carbon concentration and agitation speed on the production of cellulose were investigated using on central composite design (CCD). Three new cellulose producing bacteria were successfully isolated and identified to be similar to Enterobacter sp. SJZ-5, Bacterium sp NLAE-zl-H356, and Bulkhoderia sp. RD_DACAR_02 through morphological and molecular analysis. The most potent strain which is similar to Enterobacter sp. SJZ-5 (named as Enterobacter sp. M003) has been chosen for BC optimization study for high BC production using modified HS media. Optimization of bacterial cellulose production using response surface methodology (RSM) with 13 runs indicated that the optimal production parameters were 17.5 g/L for carbon concentration at 277 rpm for agitation speed gave 1.7g/L cellulose. It is expected that the newly isolated bacteria will be able to provide an alternative to gelatine for halal capsule production, thus minimizing and replacing non-halal gelatine usage. © 2018, Insight Society.

### SciVal Topic Prominence

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## References (15)

View in search results format >

1 Raghunathan, D.
"Production of Microbial Cellulose from the New Bacterial Strain Isolated From Temple Wash Waters"
(2013) *Microbiology and Applied Sciences*, 2 (12), pp. 275-290. Cited 9 times.

2 Pourramezan, Z., Ardakani, M.R., Reza, G.G.
"Isolation and Characterization of Cellulose-Producing Bacteria from Local Samples of Iran"
(2011) *International Journal of Microbiological Research*, 2 (3), pp. 240-242. Cited 2 times.

3 Nguyen, V.T., Flanagan, B., Gidley, M.J., Dykes, G.A.
Characterization of cellulose production by a Gluconacetobacter xylinus strain from Kombucha

(2008) *Current Microbiology*, 57 (5), pp. 449-453. Cited 58 times.
doi: 10.1007/s00284-008-9228-3

View at Publisher

4 Zahan, K.A., Hedzir, M.S.A., Mustapha, M.
The potential use of papaya juice as fermentation medium for bacterial cellulose production by Acetobacter xylinum 0416

(2017) *Pertanika Journal of Tropical Agricultural Science*, 40 (3), pp. 343-350.
http://www.pertanika.upm.edu.my/Pertanika%20PAPERS/JTAS%20Vol.%2040%20(3)%20Aug.%202017/02%20JTAS-0796-2015-6thProof.pdf

5 Ullah, H., Badshah, M., Mäkilä, E., Salonen, J., Shahbazi, M.-A., Santos, H.A., Khan, T.
Fabrication, characterization and evaluation of bacterial cellulose-based capsule shells for oral drug delivery

(2017) *Cellulose*, 24 (3), pp. 1445-1454. Cited 7 times.
doi: 10.1007/s10570-017-1202-4

View at Publisher

6 (2011) *Gelatin Manufacturers of Europe*. Cited 3 times.
https://www.gelatine.org/gme.html

7 Kurosumi, A., Sasaki, C., Yamashita, Y., Nakamura, Y.
Utilization of various fruit juices as carbon source for production of bacterial cellulose by Acetobacter xylinum NBRC 13693

(2009) *Carbohydrate Polymers*, 76 (2), pp. 333-335. Cited 111 times.
doi: 10.1016/j.carbpol.2008.11.009

View at Publisher

8 Medsker, B., Forno, E., Simhan, H., Celedón, J.C.
Prenatal Stress, Prematurity, and Asthma

(2015) *Obstetrical and Gynecological Survey*, 70 (12), pp. 773-779. Cited 2 times.
http://journals.lww.com/obgynsurvey
doi: 10.1097/OGX.0000000000000256

View at Publisher