High yield production of high value Bacterial Nano Cellulose (BNC) films from low cost crude glycerol feed

EXECUTIVE SUMMARY

CSIR-NCL has developed a high yield fermentative process for the production of high-value bacterial nanocellulose (BNC) films from low-cost crude glycerol as a carbon source. The process uses a proprietary bacterial strain Komagataeibacter rhaeticus MCC 0157 & has been demonstrated to produce 8.7 g/L of BNC at 50 L scale.

BACKGROUND

- Nanocellulose (NC) is a version of cellulose available in the nanostructured form. Apart from biodegradable NC offers better transparency, mechanical properties & permeability. NC is made from plant sources or through the bacterial fermentative process
- BNC is usually produced in a film form, used in biomedical, food & cosmetics applications due to its higher purity, suitable biodegradation & water absorption behavior
- BNC is usually made using relatively costly sugar-rich carbon sources
- There is a need for BNC film production process with higher yield & lower raw material cost

TECHNOLOGY DESCRIPTION

- CSIR-NCL process for producing BNC uses cheaper crude glycerol & yet delivers high yield BNC films with good quality

Key outputs

Process

- Higher Yield: 8.7 g/L
- Raw material: Crude glycerol
- Process: Static fermentation
- Proprietary bacterial strain: *Komagataeibacter rhaeticus MCC 0157*

CSIR-National Chemical Laboratory, Pune, India

Product

- BNC films
- High purity: (No hemicellulose & lignin), no use of solvents
- High crystallinity index: >85 %
- Water absorption capacity: 80-100 times
- Fibril width: 30–80 nm

MARKET POTENTIAL

- The global market for microbial & bacterial cellulose is likely to develop from 250 (2019) to 570 million US$ (2024) at a CAGR of 14.8%[1]

VALUE PROPOSITION

- High quality BNC with higher yield
- Used low-cost crude glycerol as raw material
- Proprietary bacterial strain

APPLICATIONS

- Medical: Bone & tissue scaffold material, dental application, wound dressing material
- Cosmetics: As an additive in cosmetics, anti-aging masks
- Food: Stabilizer, emulsifiers, texture enhancers & rheology modifier
- BNC powder is Generally Recognized As Safe (GRAS) in food industry

TECHNOLOGY STATUS

- Demonstrated & validated at 50L scale
- Technology & patents are available for licensing/co-development
- **Patent Pending: IN201911024544**

REFERENCES

1. https://www.marketwatch.com/press-release/global-microbial-and-bacterial-cellulose-market-2019-with-top-countries-data-market-size-concentration-rate-production-volume-price-gross-margin-and-revenue-2019-12-03

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